NINTH YEAR OF SERVICE TO THE METAL WORKING INDUSTRY

JUN 15 1934

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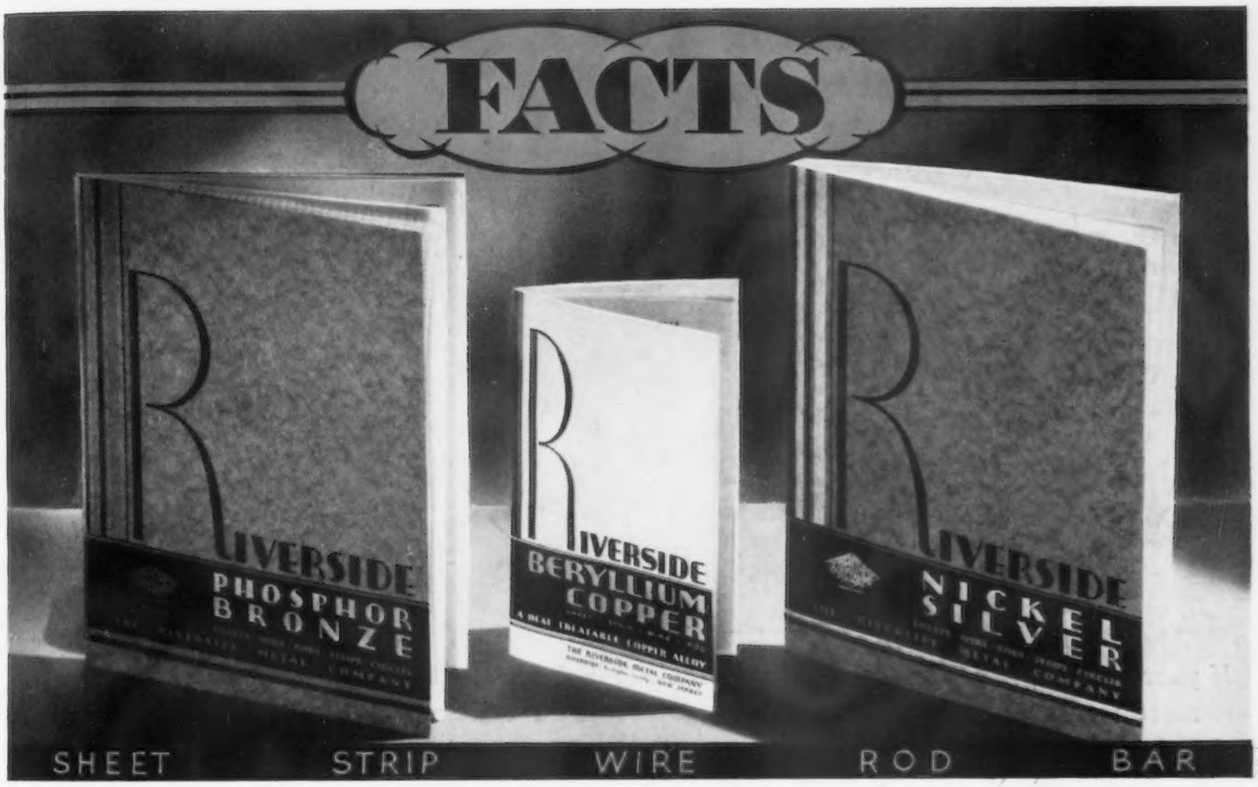

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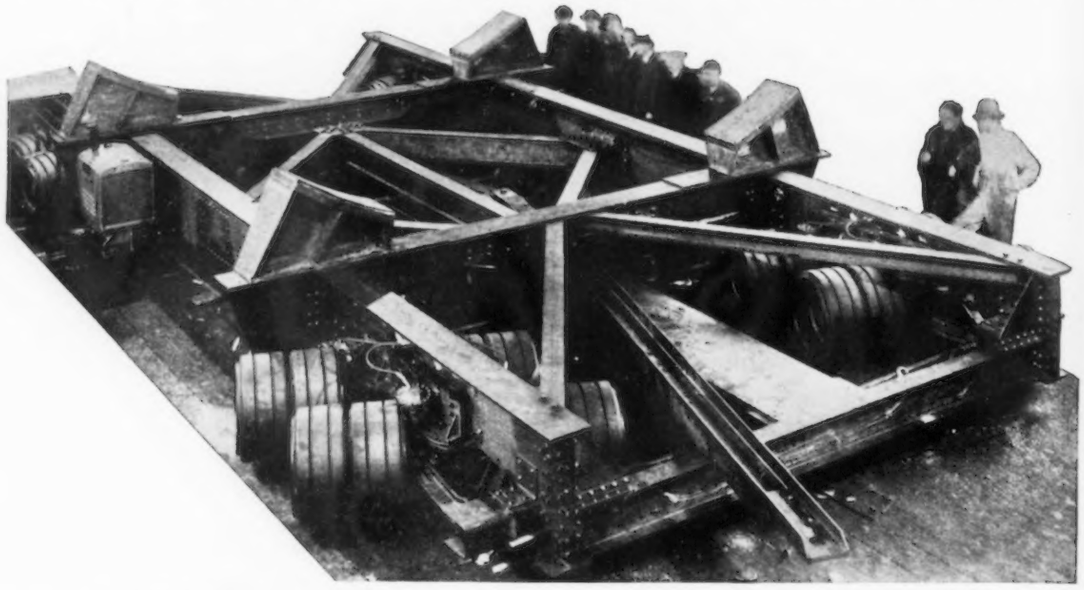

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... THE IRON AGE ...

JUNE 14, 1934

ESTABLISHED 1855

Vol. 133, No. 24

When "Hell Breaks Loose," Blame the Devil

"ALL hell will break loose," so the Amalgamated labor agents told Madam Perkins, if their union is not recognized by the steel industy.

We did not know, before, that the rather limited membership of the Amalgamated included a chapter in the nether regions, although we were aware that most of the smoke has been stirred up by hot-headed young fire-eaters who have kicked over Mr. Tighe's traces.

When hell breaks loose, the devil is to blame. In this case, as in so many other recent labor disturbances, the devil is section 7-A of the Recovery Act.

Upon the heads of the legislators, who at the behest of the labor lobby wrote the biased terms of section 7-A, rests the responsibility for the creation of a Frankenstein and for the disgraceful conflict which has followed the abortive attempt to deliver independent American labor into the hands of a ten per cent minority.

It is true that the President and General Johnson have made every effort to construe section 7-A, (which they did not write), so that it would be interpreted fairly as applied to independent labor. But a Frankenstein will not listen to reason or command, especially when egged on by the decisions of biased boards and the plaudits of distinguished visionaries.

Peace must replace class warfare and hatred if the President's objective of new prosperity is to be attained. Capital and labor cannot make progress on a road lined with brickbats and bayonets.

The threat of the Amalgamated to turn hell loose upon America is of importance only insofar as it may stampede legislators into creating additional Frankensteins. That is its sole purpose and that is why Washington was selected as the battle ground by the union leaders. They realize, just as the industry does, that the vast majority of steel workers are satisfied with existing conditions and desire to exercise the American right to work independently of the dictation of union agents.

The steel strike threat is first and foremost an attempt to drive through the Wagner bill which, even in its present modified form, is a buttress to the existing Frankenstein of discord. It is an attempt to impose, through legislation, a selfish, mercenary minority will upon a majority.

Legislation may accomplish this end, temporarily, just as it is possible to drive a cork into the spout of a steaming kettle. Ultimately, in either case, there will be an explosion.

Redouble your efforts *now* to defeat the Wagner bill, in the interest of industrial peace and progress.

By MURRAY T. QUIGG

Industry—the Scapegoat

THE author, who has taken the pains to look up the record, finds that industry was on a sound basis before the depression but that finance and Government were not. Wrongly blamed for the consequences of financial mismanagement and governmental extravagance, industry alone has a record that justifies popular faith and trust.

Your 1929 automobile, he says, was a tangible reality which worked when you bought it and still works. Your 1929 investment is now an unhappy memory. Your 1929 radio brought real service and is still bringing service. Your 1929 taxes brought less rather than more

NRA goes marching up the street to the sound of crashing brass and hollow drums, with the serried ranks of industry in close formation behind the Blue Eagle and General Johnson. Let us, however, take a quiet look back at industry in those happy-go-lucky days when it romped at will beneath the Stars and Stripes. Its task was to produce and distribute the necessities and conveniences of life. It did it. It did it as it had never been done before. And when, amid the astonishment, wonder and acclaim of the entire world, it demonstrated its ability to create wealth at little cost, we speculated with the surplus it afforded and lost our bets.

We suffered a financial crash and were forced to check the performance of industry to substantially 40 per cent of its capacity. Seeing factories idle, the idle thinkers raised a hue and cry against industry, proclaimed the necessity for government control, and demanded that, cost what it may, something be done. NRA was the result. Unjustly blamed for a breakdown in finance, industry was put in a government harness.

Notwithstanding the presumption of guilt in all the rules and regulations that have been imposed on business under the authority of the recovery act, industry need make no apologies for its past. On the contrary, its record compares more than favorably with that of either finance or Government. Before the depression industry was creating a surplus of wealth. Over and above what was spent on consumer goods by the workers and investors in industry, finance was investing this surplus for us through insurance companies, savings banks, and the security issues of investment bankers and mortgage companies, and Government was taxing us and spending with lavishness that would have made a Roman emperor look like a piker.

What Is Finance's Record?

HOW well did finance perform its function?

Through our financial institutions we loaned abroad a net of over eleven and a half billion dollars between 1921 and 1929 inclusive. Two and a quarter billion or about one-fifth of these loans are now in default and the end is not yet.

If we exclude these foreign securities and the worthless stocks we bought from our investment bankers, where did our money go? A study made last year by the Twentieth Century Fund, under the title "Internal Debts of the United States" gives us the answer.

The total long-term (more than a year) debt just prior to the War was 20 per cent of the national wealth. In 1921 it was 23 per cent, but between 1921 and 1929, while the national wealth was expanding, the financial fraternity moved this debt up from 23 to 33 per cent of our wealth. In a period of prosperity, when, under wise financial advice and guidance we should have been paying our debts, and decreasing interest rates, we actually increased our debts disproportionately to the increase in the wealth until one-third of all we had was under mortgage. This meant that an abnormal amount of all we were earning must be paid in interest. The moment the forces of expansion hesitated, the demand for money to meet interest and other fixed obligations took a disproportionate amount of what we had to spend, and money which otherwise might have been changing hands rapidly and aiding the exchange of wealth had to be stored up against the periodic day for interest payments.

Internal Debt Rose to 45 Per Cent of National Wealth

WHETHER we spend our money as interest for the use of other people's money or whether we spend it in dividends on profits for risk taking, or for the purchase of rent or labor or the products of labor is not of importance so long as the money has a rapid turnover. When, however, the proportion of our income which must be employed for a particular service increases rapidly and money must be kept on hand to meet the demand of that service, the velocity of turnover is checked. Since we rely upon money as a means for the exchange of goods and services, the flow of those goods and services is also checked and the disproportion between what is needed for fixed charges and what is available for all other purposes, becomes even greater. As a result of the collapse of values brought about by this situation—indeed the crucial situation in the depression—the internal debt in 1932-1933, represented 45 per cent of the national wealth.

How Financial and Governmental Indebtedness Soared

It is interesting to see how this debt mounted in the various categories

of the Depression ▲ ▲ ▲

protection of your life and property and in large part were expended on economic and social experiments of highly debatable merit.

Yet industry was singled out as the scapegoat of the depression and was forced to submit to unprecedented Government interference to atone for its supposed sins. Instead of being given the freedom to function with its old-time efficiency—efficiency unknown either in Government or finance—it has been led into a maze of restrictions, which have discouraged enterprise and initiative and upset normal employer-employee relations.

in which it has been divided. In the period between 1921-1922 and 1929 farm mortgages, of which we hear so much, increased by a billion and a half. But their proportion of the total debt declined from 10.9 per cent to 8 per cent. On the other hand, urban mortgages jumped 8900 millions to 27,600 millions, and from 12.2 of the total to 23.2 per cent. Railroad mortgages increased only 800 millions and declined 6½ per cent in their proportion to the total. Long-term debt of industries increased from 4800 millions to 10,100 millions. The increase going to manufacturing industries was, however, only one and a half billion. The long-term obligations of the federal Government actually declined 3800 millions, and its proportion declined from 22 to 10 per cent of the total; but the long-term obligations of States and local governments increased from nearly 9500 millions to a little over 16,500 millions—a billion every year for seven years. Finally, the obligations of financial institutions of one sort and another increased from 6000 millions to 19,000 millions. For the country as a whole, long-term indebtedness increased from 75,000 millions to 126,000 millions, a 66 per cent increase in seven years; and since 1929 the further increases of government long-term borrowings, and the obligations of financial institutions, have brought the total estimated long-term indebtedness to $134,000,000,000.

Between 1921-1922 and 1929 urban mortgage indebtedness increased 208 per cent and that of financial institutions 193 per cent as against an increase by industrial institutions, including stores, hotels and other agencies of commerce as well as manufacturing concerns, of 111 per cent. The actual increase of long-term debts of manufacturing concerns was only about $1,500,000,000 between 1920 and 1930, or one-third of the total increase in the so-called industrial class.

During this period when long-term obligations increased 66 per cent, the short-term obligations due on demand or within a year and comprising principally bank deposits and loans on various forms of commercial paper and goods advanced on credit, which formed a rough gage of the expansion of actual business, increased less than 50 per cent.

Proof of the Pudding—the Relief Loans

The result of this investment policy reflects itself perfectly in the figures of the RFC. The total loans made by that institution show that it was called upon to advance $2,110,000,000 to banks and trust companies, $402,000,000 to railroads and $222,000,000 to mortgage loan companies.

To date we know of no industries of importance which have had to go with hat in hand to the Government for a loan to save their existence; and it will be remembered that leading industries of the country for a period of 18 months after the crash continued the policy requested by the President and paid high wages and kept up employment against a declining market.

Present Heavy Burden Due to Bankers' Mistakes

The disproportion of this burden of fixed debt charge shows itself in the changes in ratio of total income paid out. The National Bureau of Economic Research (Bulletin 49, January, 1934) has issued figures on the disposition of the national income for each year from 1929 to 1932. Interest payments in 1929 were $5,687,000,000 and in 1932 were $5,506,000,000 a decline of 3.2 per cent. The total income going to wages and salaries declined from $52,000,000,000 to $31,000,000,000, a decline of 41.2 per cent. The decline in dividends for risk-taking was from just under $6,000,000,000 to a little over $2,500,000,000 or 56.6 per cent.

The percentage of the total income of the country which was paid in wages and salaries declined less than 1 per cent, while that which was paid in interest on funded debt increased over 2 per cent. This is the burden of investment banking policy during the period between 1921 and 1929 which the country carries today.

How Good Is Government's Record?

HOW well did government perform its function?

It is not so easy of analysis as that of the performance of investment banking; and divergence of social and political theory leaves a wide margin for dispute as to the functional success of government during that period when industry was demonstrating its capacity to meet the needs of men as perhaps they had never been met before. But if we consider what government costs and how it spends its money then we may make a closer judgment as to the merits of its performance, whatever criterion each of us may personally employ.

Sharp Rise in Governmental Costs

Based on figures issued by the Census Bureau, the National Industrial Conference Board has issued information from time to time as to the cost of government in the United States, and the following figures are based upon its published data.

Between 1923 and 1929 the gross expenditures of the Federal Govern-

(Continued on Page 74)

Today's Pickling Practice in Iron

THE building in which the pickling room is situated can be built of steel, brick or wood, the inside being coated with asphaltic or acid-proof paint. It should be well lighted and well ventilated for the benefit of those who have to work in it, and it should be properly heated in order that complete visibility may be maintained even in the coldest weather. Forced ventilation is essential in a good pickling room and all suction fans should be equipped with rubber blades to prevent corrosion. The general floor plan would naturally be "line production," with material to be pickled coming in at one end of the department and the pickled material going out the other end. Space for material waiting to be pickled should be ample so that loaders can work with speed and efficiency.

Crane Equipment Often Inadequate

The crane equipment should be of sufficient power to handle easily a load double the weight of the average load it is called upon to handle, and its vertical and traverse speeds should be sufficient to maintain forced production under extreme conditions. It is interesting and surprising to note how few pickling rooms, modern and up-to-date in every other respect, have crane equipment which is adequate and satisfactory from a speed and an overload capacity point of view. Crane control cabins should be located as close to the pickling tubs as possible in order that the operator will have a clear view of his work, and at the same time should be built close enough to the floor so that rising steam will not obstruct his vision.

Starting with the arrival of the acid at a plant, the first contact made is with the storage tanks. Of the various types of tanks possible, the vertical tank is recommended, inasmuch as all tanks accumulate sludge and dirt over a period of time, and the vertical tank can be made with a clean-out manhole in the side and at the bottom for the removal of this sludge. This opening would be below the acid line leading from the tank. The tank should be properly installed, which, among other things, means that it should be absolutely level in order that the amount of acid contained in it can be accurately measured. From this storage tank the acid would run through an exposed pipe line—acid costs money and pipe line leaks are not uncommon—to an accurately gaged measuring tank in the pickling room.

Good pickling practice, an accurate check on the acid consumed, especially if more than one pickling department gets its acid from the same storage tank, demands that there be some means of knowing how much acid is being used in each department. This knowledge is always obtainable with an individual measuring tank to each pickling tub or group of tubs or to each department.

A measuring tank can be of any shape; it can be made of iron, or wood, lead lined, and its size should be governed by the size of the department and the amount of acid used in a given period of time. It should have a large graduated sight feed so that the operator knows just how much acid is going into his pickling tub at any one time. At the top of the tank would be an overflow line down to one of the pickling tubs and out of the bottom would be the feed line to the pickling tub. This line would be of sufficient diameter to empty the measuring tank quickly and would end in the pickling tub a little above the highest pickling solution level. The whole acid line from the main storage tank to the pickling tub would be protected by acid-proof gate valves, one at the main storage tank, one at the inlet and outlet opening of the measuring tank, and one at the pickling tub.

There are many types and kinds of pickling tubs and tanks which can and are being used. This selection comprises the all-wood tub, usually made from cypress or long leaf yellow pine; the all-wood tub, lead, rubber, pitch or composition lined; steel tanks, rubber or acid-proof brick lined; solid acid-proof concrete or solid brick tanks with the bricks banded together with sulphur; and then there are several tanks of patented construction on the market.

All storage, measuring and pickling tanks should be accurately calibrated and charts should be made showing their capacities per one inch of depth and per one-half inch of depth in the case of a horizontal tank car storage tank. It may appear that we stress accurate calibration, gaging and charting of tanks unnecessarily often, but the number of plants where accurate information of this nature is not available is surprising.

Stresses Leak-proof Outlets

The size and shape of the tub naturally depends upon the shape and the amount of the product which is to be pickled at one time. Where feasible, the floor of the tub should have a slight slope toward the drainage outlet in order to facilitate cleaning. This outlet would be a ground and seated acid-resisting metal valve. Inasmuch as one of the largest wastes of acid in most pickling rooms comes from leaky tubs and inasmuch as the biggest part of these leaks are found in the drainage outlet, emphasis is placed on the importance of having a leak-proof outlet. One method of insuring tubs from a loss of this nature is to have an acid-proof metal or lead line run from the drainage outlet in the tub to an acid-proof valve a foot or so from the tub; from this valve the line would run to a sewer. This line and valve would not do away with the ground and seated valve in the tub. While the initial cost of this insurance would appear high, it would take but a small leak over a short length of time to more than leak away the cost of this insurance.

The steam line to the pickling tub should be well trapped so as to cut

and Steel ▲ ▲ ▲

By H. G. HOBBS
Engineer in Charge, Steel Service Division, Grasselli Chemical Co.

MAKE-SHIFT unscientific practices in pickling are gradually giving way. Improved modern equipment and the development of pickling aids in the form of good inhibitors have dethroned the old order and are lifting the pickling room itself out of the slough of fog, filth and fumes. Experienced practical picklers belonging to the plant personnel or sponsored by acid and inhibitor manufacturers are raising the pickling department to the same high standard of efficiency and economy that prevails today in other branches of industry. All these are statements of the author, who recently addressed the Association of Iron and Steel Electrical Engineers, and whose introductory remarks on that occasion were reported at length in The Iron Age of May 3, page 19.

down condensation as much as possible. The ideal method of heating a pickling tub is a lead coil which is arranged along the sides or bottom of the tub. This gives uniform heat with no dilution of the solution. However, the initial cost and the cost of maintaining this coil is such as to make this type of an installation high in overall cost. The other method is the open end steam line which goes down into the tub and discharges the steam into the solution in one solid stream, or through a series of holes in the line, or through patented jets at the end of the line. This type of a steam line should go to the bottom of the tub and be installed so as to prevent "steam hammering."

There is no argument as to whether or not agitation in a pickling solution is of benefit from the point of acid consumption, better pickling and increased production. Everyone seems to agree that it is extremely beneficial, yet the number of pickling rooms which have it are greatly in the minority. However, its advantages are strongly recommended.

Agitation has the following distinct advantages: It forces the acid through bound places in a load of steel, such as a tight yoke of rod—which would never be touched by the acid in a still pickle. Because of the movement it produces in the load itself and the constant swirling of acid, the time cycle can be materially reduced and the acid in the solution can be used up to a point which would be impossible with still pickling.

Mechanical and Air Agitation

Mechanical agitators which agitate the material in the solution are admittedly the most efficient form of agitation and there are several well-known agitating picklers on the market. The designing and building of a mechanical agitator is not the job nor the expense it would seem to be. From observation, where such installations have been made, they are apparently giving satisfaction. Agitation from the steam line is not favored or recommended, for if the pickling is done at low temperatures, the steam is seldom on for over a few moments at a time, and even then the valve is probably just cracked open. Efficient agitation cannot be expected from this set-up, and even though it is necessary to open the steam line to a point where a good head of steam is forced into the solution, there is not sufficient force to cause more than a slight swirling motion three to four feet from the end of the steam line, and in a tub of any size this movement reduces in volume as it gets further away from this line.

Where air is available, efficient agitation can be obtained with its use. The air line, made of acid-resisting pipe, is laid down the center of the floor of the tub with the necessary arms extending out from each side of the main line. The jets at the end of the arms are 1/16 to ⅛ in. in diameter. To prevent the jet of air from striking directly against and impinging on the metal being pickled, the jet is covered by a wood block approximately 4 x 8 in., which has been cut out fan shape underneath where the jet fits. This diffuses the air and prevents burning of the pickled material. Very little air is required in this operation and the agitation obtained is as strong and as violent as necessary.

Automatic steam control and temperature recording is strongly recommended. The value of this mechanical control lies not only in the economy it effects in the steam and acid consumption but also in the consistently improved quality of work which is turned out with its installation.

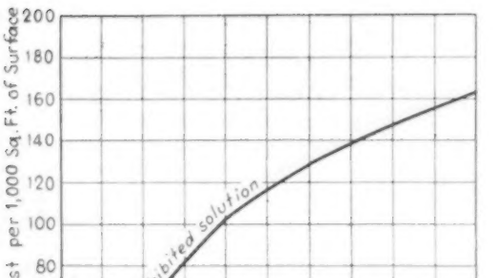
In the rinsing of pickled material there should be ample water so that the rinse tub will be kept clean with a fresh supply of water running into it at all times, and this waterline should be large enough to quickly fill the tub after it has been emptied. A high-pressure spray system fitted inside the rinse tub greatly facilitates the rinsing and cleaning of rod and wire. This spray would be above the water level in the tub and would spray the material as it is removed from the tub. A high-pressure hose is of value in the rinsing of rod and wire but the use of one should not eliminate the rinse tub which can be used as a storage tank if the necessity arises.

Adequate sewerage and drainage with a strongly constructed latticework floor around the tubs is recommended. Pickling rooms in operation are wet and messy under the best of conditions.

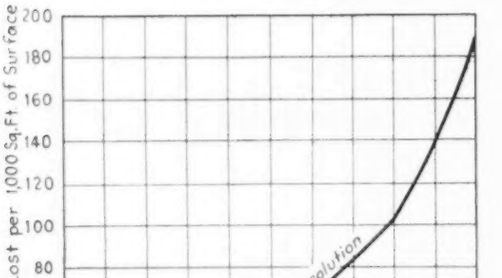
Setting the Time Cycle for Pickling

HAVING described a modern and efficiently equipped pickling room, we will now endeavor to describe how to make use of it. As such carbon steels as SAE 1010-1020 are probably the grades pickled in more plants, and to a greater extent in these plants than any other grade, we shall endeavor to describe in a general way, a pickling practice covering low carbon steel.

There are three factors which en-



Activity of an inhibited and uninhibited pickling solution in relaton to the acid concentration: Temp. of bath, 180 deg. F.; acid used, sulphuric; inhibitor, Grasselli 8—0.5 per cent by weight of sulphuric acid in solution; time of immersion, 30 min.; carbon, 0.15 per cent; steel free from scale.



Activity of an inhibited and uninhibited pickling solution in relation to the temperature: Acid used, 8 per cent by weight of sulphuric; inhibitor, Grasselli 8—0.5 per cent by weight of sulphuric acid in solution; time of immersion, 30 min.; carbon, 0.15 per cent; steel free from scale.

ter into and control pickling practice in a plant: the time cycle or time allowed for pickling one load, acid content, and temperature.

In most cases the time cycle is set and controlled by factors outside of the time actually needed for cleaning the steel, e. g., the speed of the department ahead or behind the pickler; the speed of loading or unloading material; the speed of the crane equipment in the pickling room. These factors, along with any others that may present themselves, tend to establish a set period of time for the various parts of the operation, all of which are more or less consistent under daily conditions.

While the ideal pickling set-up from the viewpoint of acid and steam consumption, and the finish and color of the pickled material, is the solution which at a low temperature will pickle the steel in the shortest period of time, it may be that the time cycle for the complete operation is of such length that the ideal set-up would pickle too fast and result in the material soaking in the acid; hence the proper set-up would be an acid content which, with a low temperature, would turn out clean material in the period of time that fits in with the time cycle of the department.

The stress on low temperature requires explanation inasmuch as the type and grade of steel to be pickled and local conditions cause a difference in every plant in what is considered a low temperature.

In the past, so far as most plants were concerned, there was just one pickling temperature used—boiling, or as close to boiling as could be obtained. The steam valve had only two positions—shut or wide open; and, as previously explained, these high temperatures were greatly to blame for a considerable portion of early pickling troubles.

Right Temperatures of Pickling Bath

As this fact came to be recognized, the line of average temperatures used began to drop. Five years ago the average line was around 185 deg. F.; today it is around 170 deg. F., and in another five years, it is safe to say, it would be around 155 deg. F.

There is no denying the fact, all things being equal, that low temperatures will produce a more economical pickling cost, a better finish and color, and less danger from hydrogen embrittlement. Other advantages of low temperature are improved working conditions, longer life for equipment and reduced maintenance costs during that life, and less chance of burned or pitted material should there be a failure of power and the material has to soak in the solution.

Today, these facts are recognized, and except for a few isolated cases where old-time picklers still hold sway, or where local conditions necessitate high temperature, the reduction of temperatures to the lowest point that will still permit the material to come out clean in the cycle of time available, is receiving close attention from operating departments.

A temperature which can be considered low in pickling with sulphuric acid, regardless of grade or type of steel or local conditions, is 150 deg. F.; in fact, it is so low that very few plants can use it and keep up to their time cycle, although we know of one or two plants which pickle low carbon steels at temperatures as low as 130 to 135 deg. F., and of other plants which are pickling high carbon steels at even lower temperatures; but they have local conditions which enable them to do so, and are so far in the minority that they can be counted on the fingers of both hands.

Temperatures of 155 to 160 deg. F. will fit 60 per cent of the pickling done today with sulphuric acid, and they can be used without loss of production. It may be necessary in some cases to play with other factors in the complete set-up, such as using a higher acid content, breaking open the material to be pickled—as for instance, coils of rod and wire—installing agitation, but in a great many cases it merely means breaking down age-old tradition and proving to the personnel that they can pickle on low temperatures.

Having a set time cycle and a proposed temperature of 155 to 160 deg. F., there remains the acid content to produce the necessary speed of pickling. As the line of average temperatures has gradually dropped over a period of years, the line of average acid content has increased correspondingly—and this is the way it should be.

Of the two methods of pickling—high acid and low temperature, or low acid and high temperature—the advantages, previously mentioned, are all with the former set-up.

Our set-up of a general pickling practice in a "run-of-mine" mill, as far as type and grade of steel and local conditions are concerned, is to try for a temperature of 155 deg. F. This may require an acid content of 5 to 8 to 10 per cent by volume,

sometimes higher. Additions of acid are made when necessary to keep the temperatures and the speed of pickling at normal, until the iron content reaches the point where it has been decided to add no more acid. At this point, the good acid remaining in the solution is used up by increasing the temperatures 10 to 15 deg. at a time, until the solution refuses to pickle clean within the time cycle, even at the highest temperature obtainable. The solution is then dumped, and in the average plant the acid content of this dump will not be over 0.5 to 1.25 per cent by volume.

When Pickling Tub Must Be Dumped

How high one can go in acid content in order to use a low temperature and maintain the time cycle depends mostly on how fast the acid is used up as compared with the speed at which the iron content of the solution increases. By this we mean that the acid content should not be so high that when the iron content reaches the point where it has been decided to add no more acid, this iron content will increase to a point of saturation, necessitating dumping the solution before the acid has been used up to where the dump is low in acid and economical. In most cases, this is the limiting factor as to how high one can go with an acid content.

Another determining factor in the life of the solution is the subsequent processing of the metal, and this, too, is subject to explanation. On a "knock-'em-down-and-drag-'em-out" job of plain pickling, where finish and color are of little importance, such as blooms, rough forgings or merchant bar, the possibilities of outside dirt contaminating the solution can be disregarded and the iron content is allowed to build up until it reaches a point of 0.63 to 0.72 lb. of Fe to a gallon of solution, or, roughly speaking, 7 to 8 per cent iron, before the addition of acid to the solution is stopped; and it may reach a point of 0.81 to 0.99 lb. of Fe to a gallon of solution, or 9 to 11 per cent iron, by the time the acid remaining in the solution has been used up and the tub is dumped.

However, when finish and color are of prime importance, and when coating of the pickled material is part of subsequent processing, outside dirt and other contamination and adherence of iron sulphate to the pickled material enter the picture, with the result that the life of the solution is shortened materially. In this picture, acid is added until the iron content is approximately 0.36 to 0.45 per cent of Fe to a gallon of solution or 4 to 5 per cent iron. From here on the operation of using up the good acid in the solution is the same as has already been described, and in this set-up the iron content upon dumping would be approximately 0.45 to 0.54 lb., roughly, 5 to 6 per cent iron.

The acid and iron contents of the pickling solution are known and controlled at all times by the use of a Na_2Co_3 or a NaOH solution for titrating the acid, and of potassium permanganate (K_2MnO_4) for titrating the iron, the acid being titrated every 1 to 2 hr. and the iron every 6 hr.

It goes without saying that this practice would embody the use of a good inhibitor in the amounts and according to the method prescribed by its manufacturer, and this use would also cover any practical and technical service which could be obtained from them.

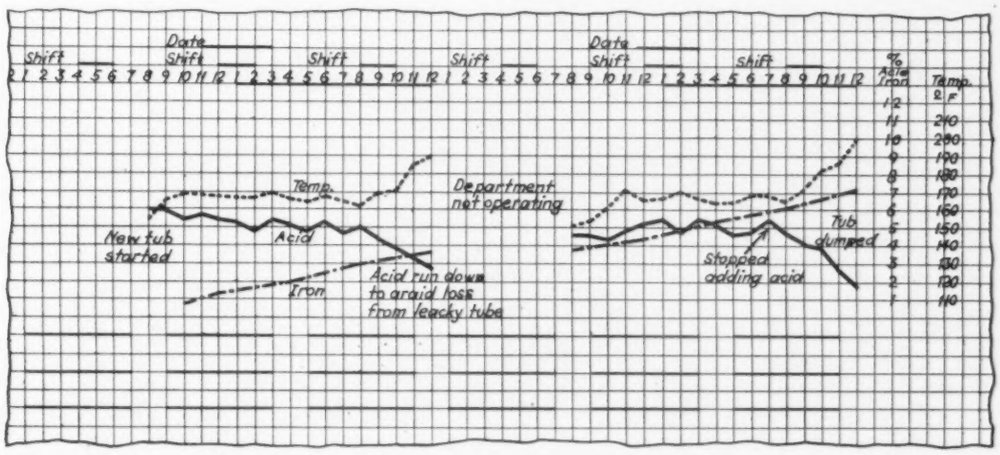
How Daily Records May Be Charted

A chart, simple to make and to use, which will show at a glance the acid and iron content, and the temperatures of the solution for the life of the chart, which is usually one week, can be made up as follows:

Use graph paper, ruled ⅛ or ¼ in. both vertically and horizontally. Each vertical line represents a 1 or 2-hr. period and the chart is so marked, from 12 midnight to 12 midnight with the p. m. hours underlined. The horizontal lines represent 1 per cent in acid and iron content and 10 deg. in temperature, which starts at 110 deg. F. These horizontal lines are numbered 1 to 12 which gives 1 to 12 per cent acid and iron content, and 110 to 220 deg. F.

Each acid, iron and temperature reading is recorded at the hour when made and each is tied up with the previous readings by a line between these readings, the acid line being in red, the iron in blue and the temperature in brown or black. At the end of

(Concluded on Page 68)



Pickling control chart may be made of this form long enough to cover one week. The chart calls for temperature readings (in brown pencil), and acid and iron titrations every hour. If pickling department can be operated on readings taken every two hours, the chart would be reduced in size by one-half. Iron content readings are made in blue pencil and acid content readings in red pencil. One chart is provided for each tub. The chart shows the life of a pickling solution through four 8-hr. shifts under actual operating conditions. The groups of three horizontal lines provide for recording the amount of acid added (first line), the cumulative acid consumption—(second line), and the tonnage of material pickled (third line). The chart includes a notation as follows: "Add acid as needed to keep the acid content and temperature at the desired level until the iron content reaches ——— per cent. At this point stop adding acid and use up the good acid remaining in tub by increasing temperature gradually until tub refuses to pickle at highest temperature. At this point dump tub."

Wear Testing

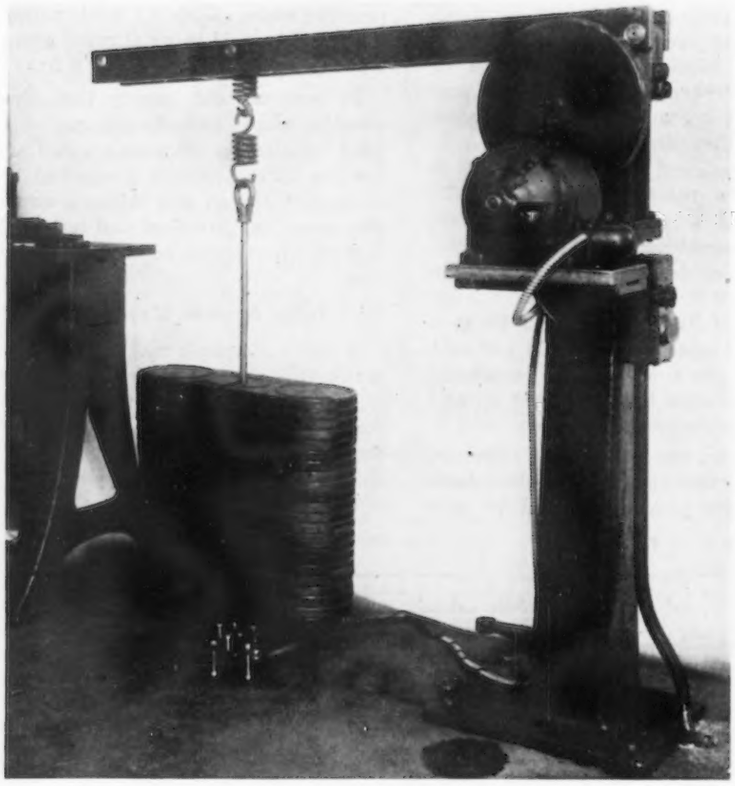


Fig. 1—Machine employed for testing cam rolls. ▲ ▲ ▲

WHEN rotary motion is to be changed to an oscillating or an irregular rectilinear motion, as when some complicated timing motion is to be effected, the cam and roll are very commonly employed. The success of such a mechanism depends not alone upon correct design of contour but also largely upon the suitability of the materials used and their treatment during manufacture.

It has not always been easy to arrange tests of a roll and cam to demonstrate their suitability and their length of life, especially when the cam has a number of lobes of different radii. Should such tests be attempted, the results usually will not be indicative of the performance of other cams of somewhat different contour. The purpose of this article is to describe a method of testing, thought to be eminently practicable, which will yield fundamental data that can be applied to the design of any cam. With such fundamental data, designs of contours may be made more intelligently and cams of longer life may be produced.

Roll Service Related to Roll Radii

If one considers the service to which a roll is subjected when engaged with a cam having lobes with a variety of radii, he will find that the service is really the equivalent of a number of different services, each one related to a particular radius of the cam. In other words, if a given roll were subjected to a number of test runs, each made in conjunction with a circular disk having the radius of one of the lobes of the cam in question, it would be found that the wear on the contact surface for a given test run would be that which would be caused by the lobe of corresponding radius on the cam in question. A series of tests of this kind will demonstrate therefore which lobe will cause the greatest wear on the roll and which lobe will limit the life of the cam roll. It may also yield valuable information with which longer life may be obtained through slight changes of contour.

Very little information has been published relating to the materials suitable for cams and rolls and the tests which are required to demonstrate results. A real program of tests made in the ordinary way requires rather extensive equipment, suitable for a wide range of loading and of speeds and recording means. For these reasons, tests of the kind using a roll and a circular disk were recently made to find out what effect heavy static loads might have on the section of the roll and what the endurance limit in cycles might be. Results of these tests are recorded later in this article.

A reconditioned Olsen wear-testing machine, shown in Fig. 1, was used for the tests. The illustration shows the method of using weights to apply the static load directly to the roll. To prevent damage to the equipment in case of failure of the roll, a switch was installed directly under the loading weights; breakage of the roll would cause the weights to drop on the switch, stopping the motor immediately. A revolution counter placed on one end of the roll shaft recorded the number of stress cycles. To prevent application of the static load by accident with the rolls not in motion, the lever was allowed to come into contact with the roll without the weights in starting the tests, and weights were added in increments after the rolls were in motion.

Fig. 2 shows the head of the roll-testing machine opened up for inspection. When in operation with the head closed, roll *E* is in contact with roll *D*. The gear guard *A*, at the extreme right, houses a motor-driven reduction unit. The large spur gear encased in this housing drives gear *B* which in turn drives gear *C*. Roll *D*, an integral part of the shaft supporting gear *C*, drives roll *E* by surface friction; roll *E*, housed in the weight-supporting arm *H*, is given a flexible surface alinement by the swivel housing *F*, which rotates about pins *G*. The weight-supporting arm *H* is hinged on fulcrum pin *I*, which is supported by the stationary bed of the roll-testing machine. Both rolls are mounted in ball bearings, *J*, which are shielded by means of felt washers to prevent foreign matter entering from the sides of the roll. Different roll ratios may be run simply by supplying the necessary diameters in roll stations *E* and *D*. The rolls are operated during the test without lubrication. Paper troughs may be positioned under roll *D* to catch any falling particles from the rolls, and in some instances a felt pad is placed against the rolls to collect surface particles for analysis.

The 1-in. and 1½-in. diameter rolls, Fig. 3, used in these tests were manufactured from a chrome-vanadium tool steel. Special attention was given the finishing of the surfaces; exceptional care was taken when grind-

# of Cam Rolls

THE method of testing here outlined was devised to yield fundamental data that would permit more intelligent designing of cam contours and the production of cams having longer life.

ing and lapping the roll contact-face in order to eliminate minute cracks that might cause residual stresses during the heat treatment. After heat treatment, the rolls were polished and the surfaces minutely inspected to ascertain whether there were any cracks due to hardening. Micrometer readings were taken for comparisons at different stages of the test.

On this specific test with a static load of 1800 lb. the Hertz contact stress of the rolls was of the order of 250,000 lb. per sq. in. and at approximately 19,000,000 cycles the decrease in diameter was of the order of 0.0008 in. The characteristic endurance curve of elastic materials has a tendency to flatten out and remain constant at 10,000,000 cycles and as this test was run to nearly twice that range, it was considered indicative of the life of the roll.

Inspection of the rolls showed that they had a purple discoloration and had lost most of their polish. A photograph of the rolls magnified 40 diameters revealed a multitude of breaks in the surface, also a few short cracks parallel with the axis of rotation. The decrease in diameter and evidence of falling debris was first noticed at 750,000 cycles. Chemical analysis of the debris, which fell in thin shiny black flakes, gave 1.1 per cent Fe, 44.6 per cent FeO and 54.2 per cent Fe_2O_3.

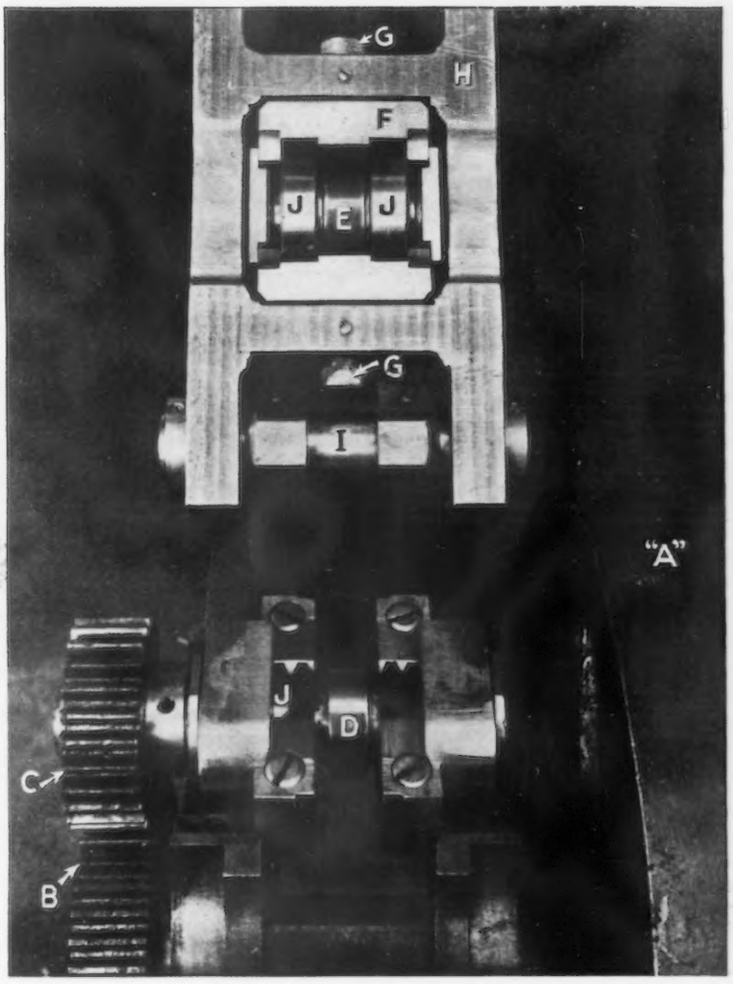


Fig. 2—Head of cam roll tester, opened for inspection. When the machine is in operation, roll E is in contact with roll D.

Attention should be called to the fact that the rolls were operated dry, that is, without lubrication, and at no time were they appreciably higher than room temperature.

In conclusion it was found that the rolls had infinite endurance so far as the static load imposed upon them was concerned, and by operating dry very little wear was encountered.

It was recognized from the tests and equipment outlined above that valuable fundamental data can be obtained, and that it is possible also, with slight modifications, to extend the useful range of testing conditions of the equipment. For example, by the construction of an oil bath it is possible to test the wear of various materials operating in oil, and by utilizing a cam to operate the weight supporting lever of the testing machine it is possible to produce the effect of dynamic loading in the rolls themselves. It is hoped that in the future this work might be extended to cover the complete field of modern applications.

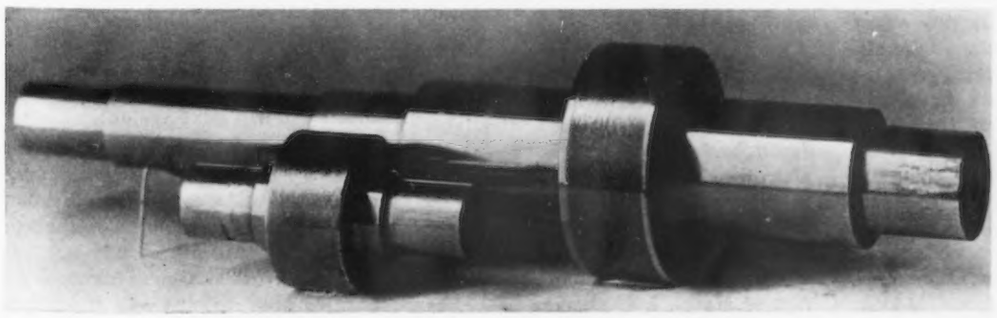


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Fig. 3 — Chrome-vanadium steel rolls, 1 in. and 1½ in. in diameter, were employed in the tests. Special attention was given to the surface finish.

How Attractive Finish Helps Metal

By HERBERT R. SIMONDS

The walls of this attractive room are entirely covered with aluminum. Even the curtain is made of aluminum foil. Note the streamlining of the fireplace in aluminum of natural color.

THE added sales value which may result from the use of colors in metal finishing has already been pointed out. Having decided upon a color, or color combination, the next step is to determine what method to use for securing this color on the particular product in question. Lacquers form one method, and their rapidly growing use in the metal industry indicates the popularity of this means of finishing. Another method is to select alloys which in themselves have the colors desired. An example of this is seen in the architectural use of stainless steels, of bronzes, and of many other so-called white and red metals.

A third method of producing a color is that of actually dyeing the metal. Experimental work is being carried on in an attempt to introduce a dye into molten metal, and some predict that colored metal, as cast, is in the realm of practical possibility. A modification of metal dyeing is metal surface dyeing. Certain porous castings, for instance, may be dipped in appropriate dyes and the color then may be set with subsequent heat treatment. This particular process, while still in an experimental stage, offers much hope for its future development.

The denser metals in natural state are particularly resistant to dyes, but slight modification of the surface, as by oxidizing, may reverse this characteristic and make these metals readily receptive to most all dyes. Designers and metallurgists have but recently become aware of the great possibilities in the surface treatment of metals. It is only within the past few months that a practical method has been announced for producing artificial patina on copper. Surface effects now may be produced on this metal at the mill, which formerly took years of exposure to the weather to create.

Oxidizing Aluminum

In the case of aluminum, a process has been discovered whereby the surface is oxidized to a controllable depth, and this coating is then dyed, after which the metal surface may be polished or brush-finished. The process which was introduced to industry by Aluminum Colors, Inc., Indianapolis, was described in THE IRON AGE of March 2, 1933, page 357. The metal is made the anode in an electrolysis tank using a special electrolyte. A coating of average thickness is produced in about 20 min. and becomes an integral part of the metal, that is, it will not flake off.

This coating, without any coloring, forms an interesting finish with some unusual properties. It has a much higher resistance to abrasion than the uncoated metal, and also is less subject to corrosion. One of its most distinctive and perhaps one of its most

Products Sales

19—Coloring Aluminum

METAL parts are now successfully colored for many uses by the application of lacquers and enamels. In the case of aluminum products, an unusual method of color application involves the forming of a dyeable oxide coating on the metal surface. This article describes some of the features of this process.

Colored aluminum strip, which is afterwards polished and buffed, is now being used for making cigarette cases, automatic pencils, cafeteria trays, and even costume jewelry.

valuable properties is a high dielectric strength which makes aluminum, thus coated, an excellent material for many electrical devices. Oxidized aluminum wire may be wound bare, to form electrical solenoids, thus avoiding the necessity of using special insulating materials. Aluminum plates, when oxidized, find use for mounting electrical instruments and for other purposes where strength and moderate insulating properties are desired.

Physical Properties

Variations in the current density and in the composition of the electrolyte during the process of forming the oxide coating produce variations in its physical properties. Thus the coating can be made porous or impermeable, and can be produced in varying degrees of hardness.

When produced with just the right amount of porosity it can be permanently dyed throughout its depth, with almost any color of the rainbow. When uncolored, the oxide coating has a silvery white appearance, which may be varied from a dull slate to a high-gloss mirror finish, depending on the method of polishing or brushing. Methods have been devised for oxide-coating sheets and strip on a production basis, and the finish thus produced is used without alteration for many familiar aluminum products.

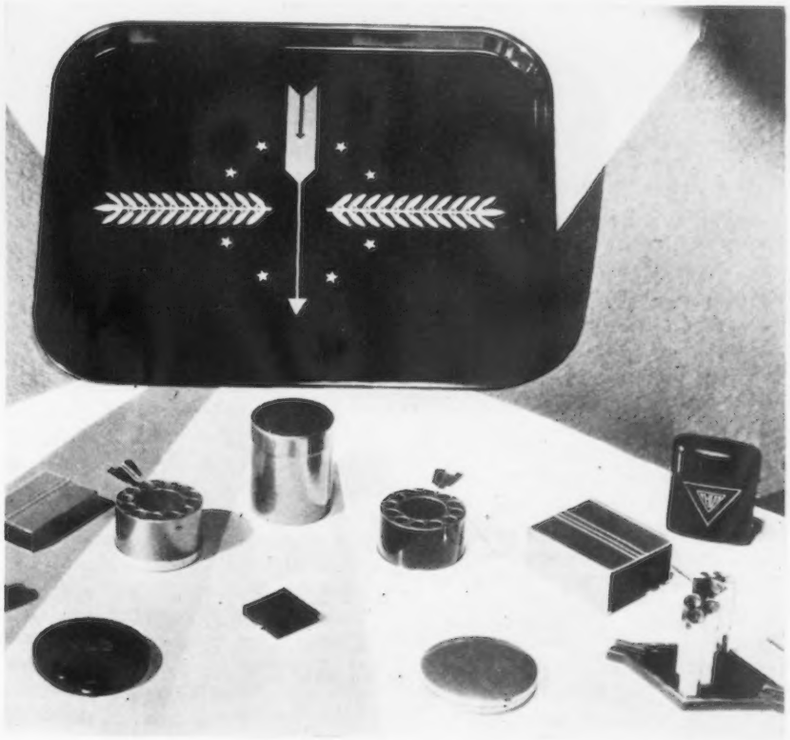
In the case of aluminum castings, a complication arises because of the presence of certain alloying constituents in the metal which tend to color the oxide. This feature, however, has been turned to advantage, for the attractiveness of this so-called discoloration is finding favor for lighting fixtures and other electrical work.

Fabricating technique involving the use of colored aluminum varies with different manufacturers. Some of them stamp and form articles from the plain aluminum sheets, then surface in the usual way with polishing wheels and buffs, and finally put the parts through the oxide-surfacing process. This surfacing does not appreciably change the polish of the original metal, so that a mirror surface, for example, will come through the oxide process with but slightly altered gloss. On the other hand, if the surface has been given a special texture, as by wire brushing or etching, the oxide coating will have a light-diffusing surface.

The abrasive resistance properties of the oxide coating have been determined in a comparative way by a series of tests, as shown in the accompanying table.

In order to obtain at least a rough comparison of this abrasion resistance with that of some enamel finishes, similar tests with enamel were made. A typical coating consisting of primer, two brown coats, draining coat, and three coats of finishing varnish, with a total thickness of three mils, gave an abrasion resistance of 1095 revolutions. For equivalent thicknesses, therefore, the oxide coat is substantially harder than the baked enamel which was tested.

Since the dyes penetrate through the entire depth of the oxide coating,



The use of aluminum inlays in micarta opens up many new fields for the designer.

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Pencils, fountain pens, signs and plaques are made of colored aluminum or of plastic material inlaid with aluminum.

the color thus produced resists the wear incident to hard usage. Dyes are available which are quite permanent indoors, although they show some fading when exposed to sunlight and weather. If a more permanent color is desired, certain pigments may be precipitated in the pores of the coating by a special process. Several so-called sealing treatments are also available, which render the oxide coating quite impervious and seal it against further staining in case it should come in contact with coloring materials such as ink. When the oxide coating is applied to aluminum alloys, its properties may differ through quite a wide range. Duralumin, for instance, when oxide coated, becomes highly resistant to salt spray corrosion, but where the maximum protection is required some further special treatment is necessary.

Oxide Coating for Textile Machine Parts

As different finishes are developed for different metals, a change in application takes place. Thus a new non-corrosive coating for steel may cause the introduction of steel into many fields formerly occupied by non-ferrous material, and in a similar way, a hard coating on such a material as aluminum has the effect of introducing aluminum into such fields as require resistance to abrasion, without excessive demands on strength. The textile industry is one such field, and oxide coated aluminum is now meeting with success for many textile machine parts. The Real Silk Hosiery Mills, Indianapolis, use a black oxide coating on various types of stocking forms such as shown on the left in the illustration. The form at the right of the group of parts is an aluminum sand casting prepared by the Paramount Textile Machinery Co., Kankakee, Ill., and is surfaced with a plain oxide coating. The spools which also are left with a natural oxide finish, have been used for more than two years on textile machinery without showing appreciable wear.

A Room of Aluminum

Gradually, and with slight changes scarcely noticeable at the time, the metals have moved into the field of decorative arts during the past ten years. One authority states that the renaissance of metals in art and architecture started with the Paris Exposition in 1925. Impetus to the new movement was given by the public which, tired of the conventional forms, sought something which would approach the permanence of the classic periods of design.

As soon as this general desire was apparent metallurgists got busy in an attempt to keep up with the many demands which the new movement placed on metal. One line of activity concerned itself with the finishing of aluminum and the dyeable oxide coating described is a prominent result.

The introduction of this metallurgical achievement into modern life may be illustrated by the all-aluminum room recently completed in Pittsburgh after the design of Harold M. Schwartz. Such a room even two years ago would have been impossible to create, for it is within this short time that dyed aluminum has reached its present practical stage.

In the Pittsburgh room Mr. Schwartz took sheets of aluminum dyed a rich brownish red and laid them end to end along the walls until he had covered the surface from floor to ceiling. This rich dark color was enlivened by a trim made of sheet aluminum in its natural color. Pewter-colored aluminum fire dogs were placed in the aluminum-trimmed fireplace. Even the curtains were made of aluminum lace. The upholstery was in yellows, and a handwoven straw-yellow rug gave an added touch of life to the room.

In the fountain grill room of Gimbels in Pittsburgh, aluminum is used

TABLE I

Comparative Resistance to Abrasion of Oxide Coatings on Aluminum

Thickness of Coating in inches	Revolutions of an Abrasive Wheel Required to Destroy the Surface
0.00011	15
0.00019	95
0.00031	268
0.00037	365
0.00074	2,563
0.00148	7,061

almost as extensively as in Mr. Schwartz's room. Here for the first time aluminum booths are used as a furniture requisite. In the general decorative scheme aluminum, dyed green and red and black, and also left in its natural color, forms the dominant feature.

Several Colors Used

Following the development of the oxide coating, and of dyes suitable for this coating, there have been many processes of refinement. A stop-off method has been discovered, by means of which more than one color can be applied to an article. The development in methods of oxide coating and dyeing has made it possible for at least one company to introduce a continuous process for oxide coating and coloring aluminum strip in coils. This continuous process has brought the material within the scope of such manufacturing as decorative buttons, caps, tags and name plates, all of which are now successfully stamped from colored strip aluminum without chipping or harming the coating.

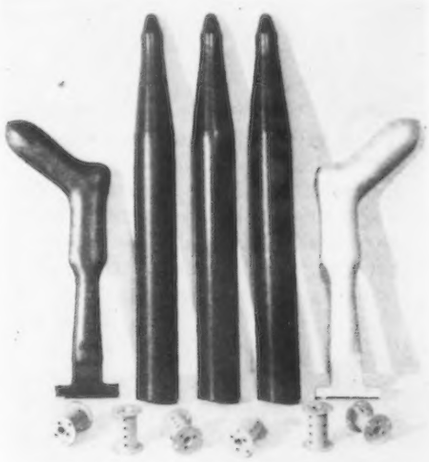
Colored aluminum may be joined with other metals or other material to produce new effects in the complete assembled unit. Because of the oxide coating, manufacturers have found some difficulty in joining the colored strip to metals such as stainless steel. However, in most cases, a solution has been found. One method is to spin a disk of colored aluminum over the projecting edge of a sheet steel frame. Other methods reported as practical for fabricating colored aluminum are spot welding and riveting.

In the case of decorative panels, colored aluminum sheets are available in sizes which, for most purposes, eliminate the necessity of mid-panel joining. On production panel work, as for bulletin boards and signs, the edges of the sheets are turned at right angles to facilitate fastening to framework members. A standard product of the Ashtabula Sign Co. is an all-aluminum bulletin board.

Colored aluminum parts may be joined with plastics by molding without affecting the surface characteristics, and this makes it possible to create some unusual inlay effects. The process is quite simple. A decorative design, for instance, may be stamped from the colored aluminum strip. The stamping is then placed in the bottom of the mold used for forming, say, a plastic tray. The colored surface of the aluminum part is placed directly against the mold which is then filled with the plastic compound and pressed to form in the usual way. When the mold is opened, the plastic trap appears with a colored metal inlay flush with the tray surface.

Modifications of this same process are being used for making switchboard panels and, going a step further, colored aluminum foil, instead of strip, is obtainable for inlay work. An extension of this principle of inlay is used by some architects for wall coverings for halls and restaurants, and in the home as covering for kitchen tables and bathroom walls.

The oxide coating on certain aluminum alloys is used for its mechanical properties in many fabricating processes. For instance, the Chance Vought Corpn., Hartford, Conn., manufacturer of aircraft, anodizes its duralumin rivets and other parts for aircraft use as soon as they are received.



The oxide coating on aluminum, when polished, forms an excellent smooth and wear-resistant material for use in the textile industries. This shows two style forms for stocking inspection and aluminum spools for silk soaking.

Many unusual surface effects may be secured through polishing and sand-blasting colored aluminum sheets. In sand blasting, various effects result from changing the air pressure, the grit size, the distance of nozzle to the work, and the angle of impact, and decorative designs are made with paper shields. In polishing, changing the direction of the rotation of the wheel with respect to the travel of the work gives a surprising difference in the "color" or light reflecting properties of the surface.

Research work is under way at Columbia University Laboratories on a process of aluminum plating, and a report from some of the investigators indicates that this will become a practical process. It seems possible, therefore, that the future may see a method of coloring many different metals by first plating these with aluminum and then oxidizing and coloring the aluminum coating.

Mellowes & Co., Ltd., London, have done interesting work in the field of spraying aluminum alloys. This is done by blowing aluminum which is melted in an acetylene flame at 560 deg. C., and the process is used for protecting steel against corrosion in cases where an increase in weight is undesirable.

The broad subject of painting different metals will be discussed in forthcoming articles, but it may be mentioned here that the oxide coating on aluminum produces a surface which forms an excellent base for the application of paint.

Blue Edges on Sheets In Box Annealing

IN discussing box annealing in a paper presented by Eric R. Mort, Swansea, Wales, to the (British) Iron and Steel Institute, the author referred to the fact that despite all precautions it is sometimes found that sheets bear a blue edge, the extent of which varies from ¼ in. to several inches. This condition has been encountered without any warning whatever after a trouble-free period and has suddenly disappeared without any change in the practice.

"One plant using cleaned producer gas for deoxidizing," said he, "has found that the sheets in one pot out of perhaps a dozen connected to the same gas line will bear a blue edge, while the remainder are perfectly clear. This seems to indicate that the heating conditions have some bearing on the problem, but there is room for research so that a standard procedure may be adopted that will give consistently good results. The discovery of blue edges on sheets wanted for rush delivery is something that causes a great deal of inconvenience.

"There is no doubt that batch annealing furnaces are more satisfactory than the continuous type. They are more expensive to operate, perhaps, but when high-quality sheets are being manufactured close control on each and every charge must be maintained, and this is not possible in continuous furnaces. In the batch type every charge receives individual attention, and the furnace is operated so as to give optimum results on the particular grade of material being annealed. Best results can only be expected from continuous furnaces when, first, the charge weight is kept at a fairly constant figure, and, secondly, when the size and gage of the charged sheets are fairly uniform."

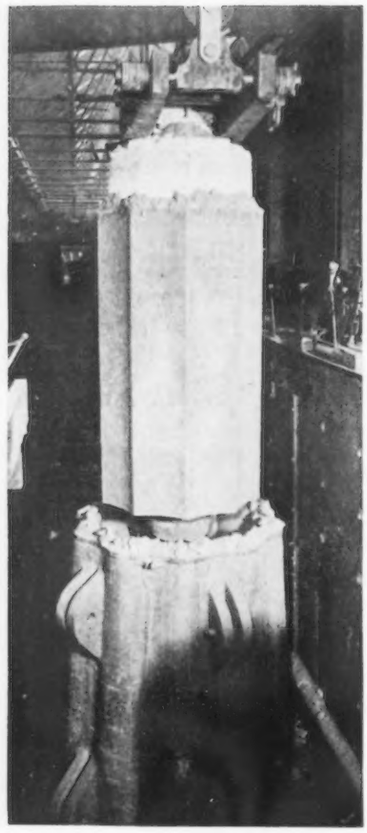


Fig. 1—Removing the 108-in. steel ingot from the mold. The mold weighs 392,000 lb. and the ingot weighs 427,000

Oil Cracking Drums Made From Heavy Forgings

By EDWIN F. CONE

OF the many and diversified products of the American steel industry, that of heavy forgings is one of the most important. The production of hollow forgings is of particular interest, as their manufacture involves great skill, large investment in plant equipment, and the most careful supervision from the liquid metal phase to the completely machined product. This is, of course, especially necessary in the case of hollow forged soaking or cracking drums or other high-pressure vessels produced by this process for the petroleum and chemical industries. Their use involve heavy service conditions and failure usually results in a heavy loss of life.

The purpose of this article is to describe the manufacture of such hollow forgings by the Bethlehem Steel Co. in its extensive heavy forging department at Bethlehem, Pa. Some of the advantageous properties and their application to industry will also be discussed.

All hollow steel forgings are made from solid ingots, and these vary in size to suit the dimensions of the final product. After pouring, the fluted ingot is transferred to the vicinity of a large press when it is sufficiently cool to handle. It is then put in a large heating furnace where, after many hours of heating, it is brought up to the proper forging temperature. Under a 14,000-ton hydraulic press it is rounded and discards are then made. The discards are often very large and their removal are necessary in order to insure that only the best portions of the steel ingot are used for the product.

Reheating, and upsetting or shortening to the form of a rounded block, preparatory to piercing or hot trepanning, is the next step. The piercing operation removes the center metal of the original ingot. This operation prepares the steel for insertion of the first mandrel or enlarging bar, on which, after repeated reheatings, it is

Fig. 2—After removal from the mold the ingot is rounded up and discards are taken. Above is shown the upsetting and punching operation on the resulting block.

drawn to proper length and to the desired inside diameter and wall thickness.

After the above operations the metal is in the form of a large cylinder. After suitable heating the ends are closed in or necked down by large presses. Prior to the necking down the rough metal at each end is cut off and careful measurement checks are made to insure accurate dimensions and alinement. Careful annealing in large gas-heated furnaces to remove forging strains and to insure the best structure is the next operation, after which physical and other tests are taken to check whether the metal comes up to specified qualities and possesses adequate uniformity.

To complete the finished product there are involved various machining operations and drilling of holes accompanied by several types of inspection. All temperatures during the reheating and annealing are regulated by optical and couple type pyrometers from the beginning to the end of the forging process, and a complete record of every step is kept for every forging.

Whether hollow cracking drums, high pressure boiler drums or any other type of hollow forging are to be produced, the above practices are employed. The result is a forging solid throughout with no seams or joints. Because the steel has been thoroughly worked during the operations and subjected to proper heat treatments it is in the best possible physical condition to stand up under the severe stresses to which it will be subjected.

An important item is the manufacturing equipment involved. The various heavy presses and heating and heat-treating furnaces are large and expensive and are of the same type as those used for heavy ordnance. The heating and other operations involve large expenditures of time and unusually large equipment for handling. Some of the newer types of furnaces are very interesting. As designed by the Bethlehem Co., they have a removable car bottom, and the circulation of the air and gas as well as the pressure and temperatures are accurately regulated by automatic control devices.

The size of hollow drums and other forgings which can be made by the process here outlined is limited by the size of the ingot. The largest one which has been made by Bethlehem originated with a 427,000-lb. ingot which was 108 in. in diameter, and the ingot mold itself weighed 392,000 lb. The illustrations show the mold

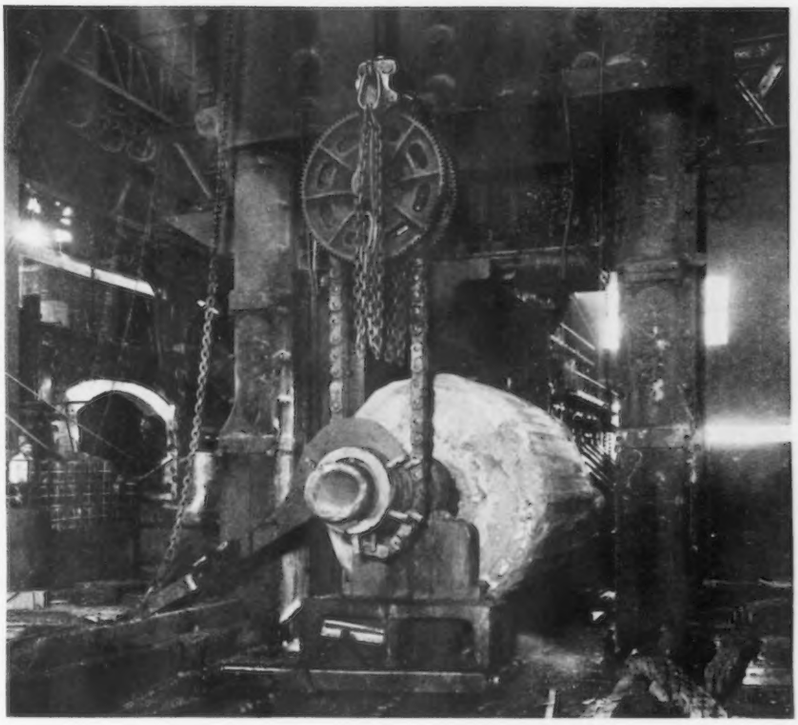


Fig. 3—After punching, the hole in the block is enlarged over a small mandrel under the press shown above.

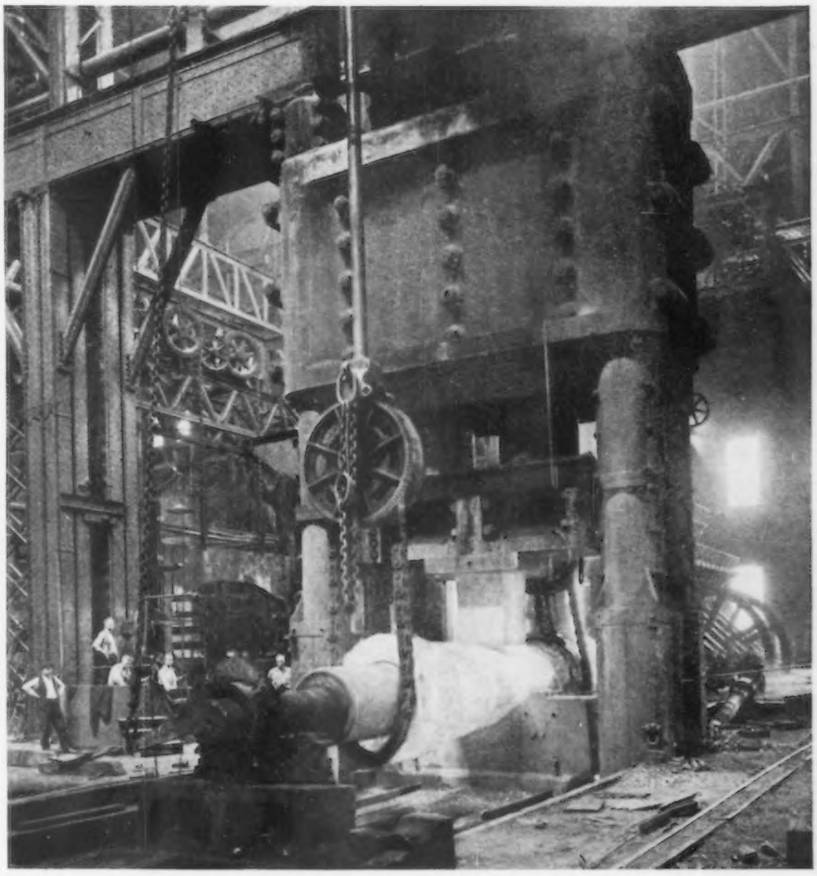


Fig. 4—When the hole is enlarged to sufficient size, the hollow cylinder is forged under a 14,000-ton hydraulic press in the manner illustrated above.

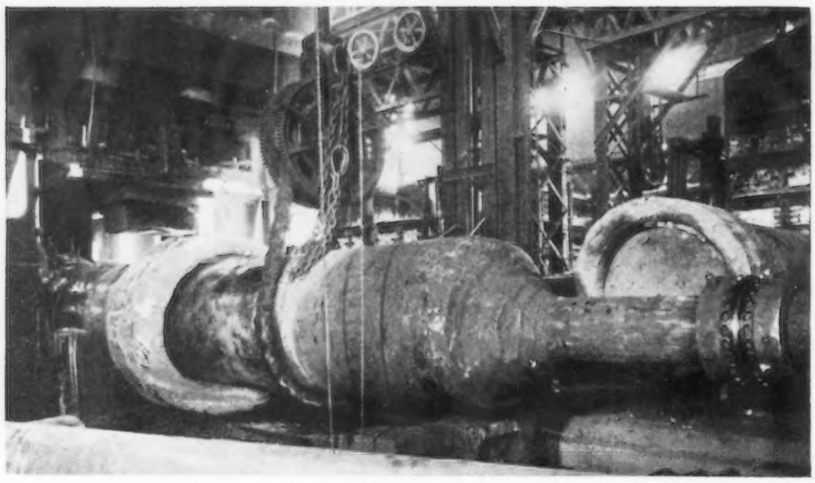


Fig. 5—When fully forged and properly heated, the hollow cylinder is drawn to approximate final length and shape on a mandrel as portrayed in this view.

and forging operations, all of which involved considerable manufacturing skill.

The amount of discard involved as the ingot is transformed into the cylinder or drum is quite large. Including the original discard from the top and bottom as well as the removal of the central portion and the loss in scaling and machining, the total in the case of the large forging mentioned above was about 197,000 lb. or about 46 per cent. The net weight of the finished drum was, therefore, about 230,000 lb. This particular drum had an inside diameter of 72 in., an overall length of 40 ft., and a wall thickness of 5½ in. Wall thicknesses up to 6½ in. have been produced.

The operations described naturally are quite costly. The high costs, however, are warranted by the conditions which hollow forged drums of this type must meet. Large numbers of these drums are used in the oil-cracking processes of refining companies. In this industrial application, pressures as high or higher than 700 to 800 lb. per sq. in. are encountered. It is suggested that in the near future these pressures may be increased up to 2000 lb., with an elevation in temperature at the same time from the usual 850 deg. F., to above 950 deg. F. Manifestly, if a drum should weaken there would ensue a serious loss of life as well as a destruction of valuable equipment and a production loss. If something abnormal develops, such as a small amount of water getting into the system, the insurance of a large factor of safety is essential. To meet this possibility of highly increased pressure there is a need of the large wall thicknesses obtainable from the use of hollow forgings.

Other conditions which such hollow forgings must meet include a resistance to corrosion and a resistance to uneven temperature stresses between the top and bottom of the drum. Corrosion, particularly in handling oils, may reduce the thickness of the walls measurably each month, and the ultimate result will be a wall too thin to withstand operating conditions. The thick walls of hollow forgings fully meet these conditions as well as those of uneven temperature stresses. The continuous smooth surface and funnel-shaped ends of the hollow forgings also facilitate the removal of coke at various times during the cracking operation.

A cracking drum should have no joints to serve as starting points for local corrosion, no seams in which leaks may originate, smooth interior surfaces and funnel-shaped ends to facilitate cleaning, walls thick enough to provide needed safety factors, and have an initial cost commensurate with its length of service. A one-piece hollow forging fulfills these conditions very well.

The hollow forgings of plain carbon steel contain the best portions of the steel ingot so worked to have the highest possible physical properties. Many hundreds of these hollow drums have been installed by Bethlehem and not one has yet failed in service.

Timken Breaks Electric Steel Record

THE electric furnace department of The Timken Steel & Tube Co. poured more steel in May than ever before in the history of the company. The former record was 13,192 tons of electric furnace alloy steel in a month, but during May, 1934, the Timken Co. poured 14,828 tons.

This is believed to be both a U. S. and a world record for electric furnace alloy steel production, and is more remarkable because of the rigid time requirements imposed on the melters to insure only quality steel production.

Electric furnace production at the Timken plant has been 63,267 from Jan. 1, 1934, as against 24,200 tons for the corresponding period in 1933.

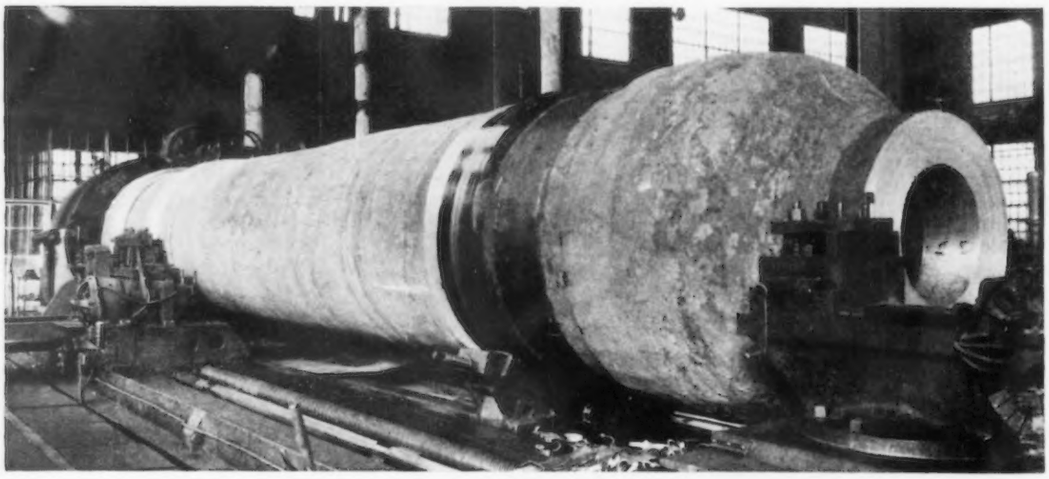


Fig. 6—The drawn cracking drum is then heated on the ends and necked down under a press. Final measurement checks are made, and machining operations are carried out on the large lathe shown above. The completed drum weighs 230,000 lb.

Tomorrow's Industrial Furnaces to Have Insulating Refractories

By H. M. CHRISTMAN
Ceramic Engineer, Massillon Refractories Co., Massillon, Ohio

REFRACTORIES may be termed a necessary evil. They add nothing directly to the finished product and are merely a contributing means to an end. The same comment applies to our industrial furnaces. They are merely a container filled with heat into which the product is immersed for the desired time.

Primitive man's furnace was first merely a nitch in a hillside, later augmented by building the adjacent sides and roof of stones. But the heat got out rapidly through the walls and joints, due to irregularities, so he plastered the joints with mud and built thicker walls. In this country, industrial furnaces were largely constructed of natural rock materials well into the nineteenth century. The refractory industry really came into existence about 1850 and began producing burned units or brick of rectangular shape which could be conveniently handled and built into furnace walls. This practice gave opportunity of selecting the raw materials from which the burned units were produced. By about 1900 the refractories industry was well established, with efficient mechanical means of producing units or brick of uniform size, the quality of which had constantly been improved by a more careful selection of the raw materials. From a ceramic standpoint they could be considered a well-developed product, but from a furnace efficiency standpoint they had little to offer in advance of primitive man's hillside furnace. They were heavy, massive structures which failed to hold the heat efficiently in the furnace.

Heat units, the B.t.u.'s, are active critters, incessantly on the move toward a cooler spot. Figuratively, you cannot stop them, so the next best thing to do is slow them down as much as possible. It is hard to visualize B.t.u.'s, so let's consider a simple comparison and think of them as paint, keeping in mind that an industrial furnace is merely a container, the walls of which are refractories.

Suppose tomorrow morning you were to hire a gang of painters, but "lo and behold," after they are on the job a short time you discover them using buckets full of pin holes through which the paint is constantly leaking in appreciable quantities. Today dollars cannot be thrown away in such an inexcusable manner and you would take hasty steps to eliminate this loss. One way to stop this leakage would be to set each leaky paint container into a larger bucket which does not leak, and this was the manner in which the B.t.u. leakage was appreciably reduced in industrial furnaces—by covering them as completely as possible with a layer or covering of diatomaceous earth. This practice began about 1900 and constitutes the first major step in increasing furnace efficiency and probably is representative of the majority of our present-day furnaces.

THE industrial furnace of the future will be light in weight and more or less portable. It will have refractory heat insulation. It will thus be speedy and efficient, because the heat losses represented in the heat storage of the walls and roof and the heat transmission through them will be minimized. This, in a word, is the message brought by Mr. Christman to a recent meeting of the Detroit chapter of the American Ceramic Society. His discourse is here reported substantially in full.

But, returning once more to our paint bucket comparison, suppose on the second morning you discovered that due to the peculiar nature of the containers used, your gang of painters sit down for several hours and clean out a layer of dried paint, which is thrown away, to the extent of probably ½ gal. for each gallon bucket used. This inexcusable loss in time (or production in the sense of surface covered per man per day) and paint thrown away has its analogy in industrial furnaces as heat storage. Heat storage may be defined as the number of B.t.u.'s you must store up or saturate the walls of your furnace or container with before you can begin work, and this quantity is a total loss when operations are suspended. Now if your gang of painters works 24 hr. per day and stop only over week-ends, the loss will be reduced and, correspondingly, in continuous furnaces the importance of heat storage is lessened, but, nevertheless, it is always an ever-present evil. It costs you time or loss of production and money (the exact cost per B.t.u. depending whether electricity, gas or oil is used), yet it does not give you one iota of work in return.

Diatomaceous earth proved an efficient material on the exterior of industrial furnaces—why not use it on the interior of the furnace? Well, unfortunately, while it is the most efficient and widely used secondary insulating material in its natural form, diatomaceous earth will not stand temperatures of more than approximately 1300 to 1400 deg. F., and, due to its cracking, dusting and other physical characteristics, cannot be

used in contact with combustion gases and flames.

About nine years ago a draftsman in one of our large engineering departments asked me why we did not make a firebrick with some insulating properties. That statement started our work immediately, and, quite recently, others, on what is destined to become the most progressive step in increasing industrial furnace efficiency—the production of refractory insulating brick of good strength, temperature-resisting qualities equal and superior to the best grades of firebrick, excellent insulating properties and low heat storage, which can satisfactorily be used in furnaces directly in contact with combustion gases and in heating zones of every description.

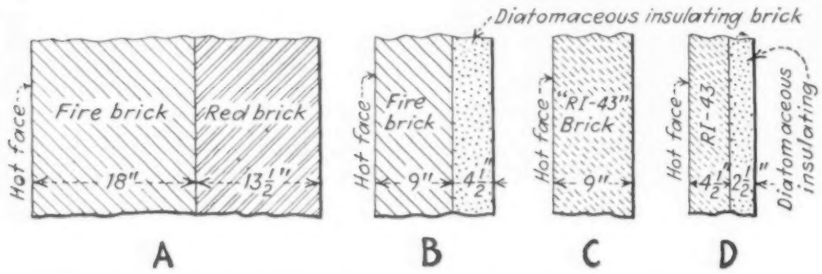


Diagram of four walls of different thickness but of approximately the same heat insulating value. Wall A weighs 8½ times as much as wall C and over 12½ times as much as wall D. To bring the inside face of the wall to what may be termed a maximum annealing temperature, 10 times as much heat must be stored in wall A as in wall C and more than 10½ times as much as for wall D. The author's figures are as follows:

Wall designation	A	B	C	D
Weight of wall per sq. ft. of surface, lb	340	112	40	27
Heat storage for max. annealing condition, B.t.u.	78,000	40,000	7800	7400

The Matter of Low Heat Storage

The accompanying sketch shows four wall constructions of approximately the same insulating qualities, but of different weights per square foot and different heat storage needs at annealing temperatures. The values used in this computation were based on the heavier dry pressed firebrick as commonly used in annealing and, while heat computations seldom check when calculated by different people, the comparisons are correct.

Let us first consider the advantages of low heat storage in intermittent furnaces or kilns of the C and D types of wall construction: They can be brought from cold to working or maximum temperature in only a fraction of the time and with only a fraction of the fuel required to bring the corresponding furnaces or kilns to temperature when lined with heavy, heat-absorbing firebrick. Actual savings from service reports show anywhere from 50 to 90 per cent, depending upon the exact type of furnace and its operation. A brick manufacturer recently built a kiln of refractory insulating material and reports a saving of 40 per cent in fuel and time. His type of ware is heavy and massive per cubic foot of kiln interior, which indicates that if a lighter type ware were being fired (white ware, sanitary ware, pottery, etc.), the savings would be much greater.

In the metallurgical industry, malleable pot-type annealing, carbonizing, ball and race type of sheet and strip and other batch-type annealing furnaces, and in the ceramic industry, intermittent kilns are usually of a very heavy, massive type of wall construction. They will soon be replaced with furnaces containing walls of refractory insulation, which will affect savings of 30 to 75 per cent in fuel per ton of ware treated and give an appreciable increased tonnage production per furnace due to the corresponding time saving or shortening of the burning cycle. Equal and greater savings can be made in the dozens of small furnaces which are heated up each morning, such as tool room, tempering, rivet heating, kettles, etc., and, while the savings are small per furnace, the aggregate per year would be tremendous.

Refractory Insulation Good for Even Continuous Furnaces

Heat storage in continuous furnaces is of less importance, but, unfortunately, in the last few years few furnaces have been continuous. The cost of putting large continuous furnaces and kilns into operation is enormous, and refractory insulation can certainly go a long way in alleviating this shortcoming. Moreover, continuous furnaces are merely a cog in a production cycle and usually the production of a large part or even the entire plant depends directly upon furnace continuity.

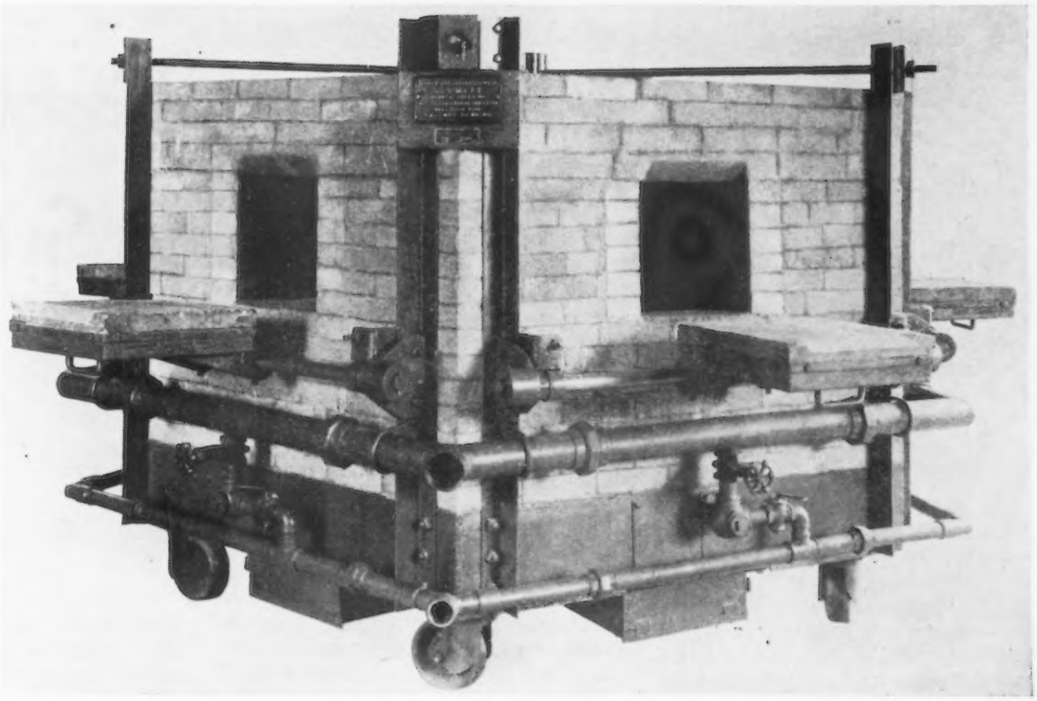
Let us consider a copper billet or similar furnace, operating at peak production. A skid rail breaks and piles billets up to the roof, necessitating several men entering the furnace to make the required repair. If the furnace is lined with refractory insulating brick, it can be cooled in less than half the time, repair made and heated again in less than half the time, as compared with the corresponding furnace lined with ordinary, heavy, heat-absorbing firebrick, thus reducing to approximately 24 hr. a delay which would have been 40 to 50 hr. in a heavy firebrick furnace. When hot billets cease coming through the furnace, it automatically shuts down probably a hundred thousand dollars worth of motors, rolling and other equipment and throws possibly 50 or 100 men out of work. The saving of 20 to 30 hr. production on this type of unit probably amounts to more than the total cost of the furnace.

When continuous furnaces are used for miscellaneous work, requiring different temperatures, they can be quickly changed from one operating temperature to another without the customary lag or delay, when lined with refractory insulating material. An example of this type is a continuous porcelain enameling furnace, burning cast iron work at about 1400 deg. F. and then sheet steel at approximately 1600 deg. F.

In car-type continuous furnaces and kilns, the ware on the lower part of the car is invariably softer or less burned than the ware on the top, partly due to no heat being supplied from the car surface, but also because a great quantity is absorbed, by the heavy, massive refractories usually used. Refractory insulating car top shapes eliminates this lag and tends to produce a uniform temperature by greatly reducing the heat absorbed and also providing an insulated structure which, in addition, keeps the cars and track cooler and prevents their warpage.

Reduced Weights of Refractory Insulated Furnaces

Another advantage of refractory insulated furnaces is that less floor space is required. Due to greatly reduced weight, refractory insulated furnaces can be so built that they can easily be moved when desired, in place of tearing down and rebuilding. A large steel plant recently built several furnaces approximately 32 ft. long, 12 ft. wide by 8 ft. high in spot welded metal shells, in such manner that they cannot only be moved on rollers in their plant but could be lifted by crane and shipped



Portable furnace built of Alumite RI - 43 grade refractory insulating material.

to another plant if desired. The reduced weight of refractory insulated furnaces makes possible their use on upper floors of buildings where the ordinary heavy furnaces would not be feasible. Refractory insulating tunnel kiln car tops require less power to move cars both while in and out of the kiln.

Refractory insulated walls are usually of lower initial cost. While the material cost in some cases may be slightly higher, any difference is usually more than offset by reduced erection costs (sized brick, thinner walls, brick easy to cut).

Refractory insulated furnaces usually show time and fuel savings greater than calculated, probably due to two reasons: (1) because their walls become incandescent quickly, they heat the charge efficiently much sooner, somewhat in accordance with the principle of the luminous flame burner; and (2) in intermitten furnaces, the furnace or kiln has finished its anneal or burn and has been shut off before the walls have reached an equilibrium condition. Frequently, when rebuilding with refractory insulating walls, it has been found necessary either to use smaller burners or operate only part of them.

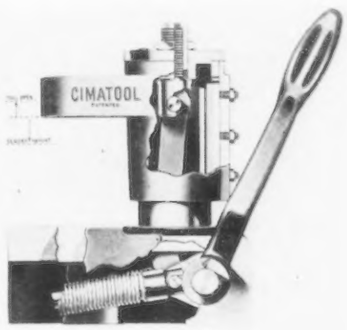
The furnace of the future will be light in weight, self-contained and movable as a unit, speedy and flexible, and, last but not least, efficient. Since the two major B.t.u. losses are radiation and heat storage, and refractory insulating reduces both, it is certain that it is destined to play a leading role in the interior construction of tomorrow's furnace and will be backed up by diatomaceous or other efficient secondary insulation, used close to its safe maximum working temperature.

All comments made apply chiefly to heat processing furnaces and not to melting or similar furnaces, where the refractories are dissolved or attacked by molten metals, slags, chemicals or gases. Refractory insulating materials are not adapted for such work or for the building of the checkers in regenerative chambers.

Paulins Drill Jig Redesigned

AN improved model of the patented Paulins drill jig is being manufactured by the City Machine & Tool Works, Dayton, Ohio, which acquired the Paulins Tool & Engineering Co., Detroit.

The Paulins linkage and locking designs have been retained in the newer designs. In the spring type mechanism, the two springs exert from 90 to 105 lb. pressure. Bushing plates and other details for both single and double-post models have been simplified and improved, and this redesign includes both positive lock and spring type mechanisms. As shown in the illustration, all parts of the toggle and clamping mechanism are entirely inclosed and, therefore, protected. A large diameter barrel materially adds to the sturdiness of the tool.



Bushing plates and other details have been improved. Change in design of manufactured parts does not obsolete this Cimatool-Paulins jig.

It is stated that changes in design of manufactured parts need not obsolete the Cimatool-Paulins jig. The main body of the tool remains serviceable, and if a new bushing plate becomes necessary, it can be furnished from stock. For users desiring to utilize the Cimatool-Paulins special lock on jigs of their own design, these locks are available. A complete stock of jigs and parts is maintained at Detroit as well as at Dayton.

Corrosion Problems In Iron and Steel

By FRANK N. SPELLER
Director, Department of Metallurgy and Research, National Tube Co., Pittsburgh

ABOUT three-fourths of the iron and steel products require some kind of protection if only for the sake of appearance. Sheets, plates, wire, and pipe often have a comparatively short life without adequate protection. Idle metal, unfortunately, corrodes at a faster rate than busy metal. This fact has been well demonstrated in the past three years in the case of idle mills, smoke stacks, ships, cars, and similar steel construction. The hulls of ore carriers on the Great Lakes are usually not repainted after launching, and up to the period of the depression showed very little deterioration. After two years' lay-up in the harbors many of these hulls were pitted over ⅛ in. deep.

The rate of corrosion of unprotected iron or steel varies with the environment from an insignificant amount to ½ in. penetration per annum. Assuming that the average useful life of iron and steel products is 50 years and that 700,000,000 tons are now in use in the United States, the amount produced last year in this country would have been hardly sufficient for renewals made necessary by corrosion. Hadfield estimated the world's wastage of iron and steel in 1932 to be 67,000,000 tons, which would indicate a loss in the United States nearly three times as large as my estimate. To this must be added the expense of renewal, interruption to business, and other incidental expenses, which, as a rule, considerably exceed the cost of the metal. However rough these estimates are, they serve to illustrate the importance of the problem to the iron and steel industry and to the taxpayers at large.

In atmospheric corrosion, the predominant factor is the moisture; in water, the oxygen concentration; in soil, the electrical conductivity, total acidity, drainage, etc. The principal factors that have been recognized and studied are listed in the accompanying table and are grouped for convenience according to whether they are mainly a function of the metal or of the environment.

The environment, as a rule, influences both the actual and relative rate of corrosion of a metal much more than the ordinary variations found in the metal. It has been demonstrated that all base metals such as iron, copper, aluminum, etc., acquire a film when exposed to air at normal or elevated temperatures, and that it is usually the resistance of this surface film that determines the life of the metal rather than some internal property, for the metal usually does not come into direct contact with the attacking medium. Metals such as chromium, nickel, copper, and aluminum form very resistant films in some environments but not in others, and such elements have the power of conferring on iron, when alloyed with it in solid solution, some of their film-building power according to the amount of alloying elements present. The determination of the amount of film-forming constituents that will give the maximum corrosion resistance to iron at the lowest cost is a promising but difficult field of research.

Factors with Reference to Corrosion in Presence of Water

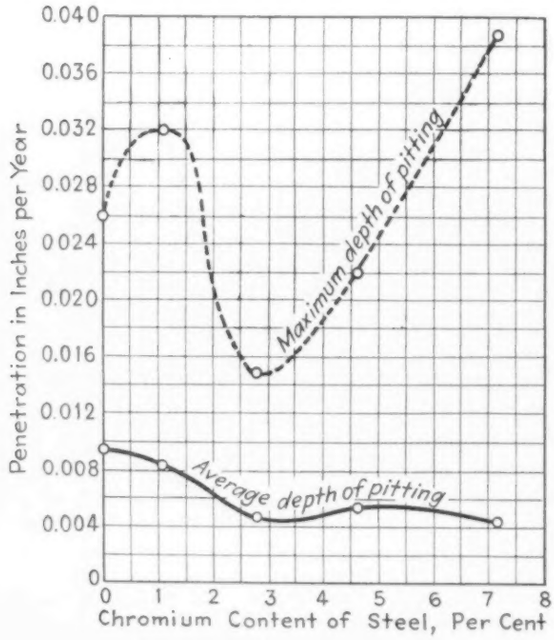
I. FACTORS ASSOCIATED MAINLY WITH THE METAL

1. Standard single electrode potential
2. Composition and chemical homogeneity
3. Structural homogeneity; solid solutions, separate aggregates, amount and distribution of nonmetallic inclusions, etc.
4. Surface finish
5. Inherent power to form surface films
6. Internal strain
7. Over-voltage of hydrogen on the metal surface.

II. FACTORS THAT VARY WITH THE ENVIRONMENT

1. Effective potential[a]
2. Concentration and distribution of dissolved oxygen
3. Hydrogen-ion concentration
4. Specific nature and concentration of other ions in solution
5. Velocity of motion of solution
6. Temperature
7. Deposits of corrosion products
8. Contact with dissimilar materials

[a]The potential is dependent upon composition of metal and electrolyte, temperature and other factors listed above. Surface film formation is also a function of both the metal and environment.



Influence of chromium on rate of corrosion of steel in fresh water

Penetration of corrosive attack in Pittsburgh city water at 140 deg. F. aerated and having pH value of 6.8. Maximum depth of pitting plotted is average of deepest measurements for three specimens for period of two years.

Recent study of the surface films on metal has thrown a new light on the mechanism of corrosion. The presence of invisible films has been demonstrated by separating the film from the metal so that the film can be examined under the microscope, and their growth has been traced by their

THROUGHOUT Doctor Speller's discourse, which represents a large part of the Henry Marion Howe memorial lecture delivered by him before the American Institute of Mining and Metallurgical Engineers, emphasis is placed on the economics of corrosion prevention. What corrosion in the iron and steel fields costs when preventive measures are ineffectual or absent; the magnitude of the use of neutralizers, as in the oil industry; the volume of paints consumed for protective coatings, and the economy of corrosion-resistant alloy steels, particularly as to experiences with steel railroad cars—all these come in for review. The baffling problems of soil corrosion get extended attention, with some practical observations regarding bituminous and cement pipe coverings. Doctor Speller sees a need for even closer cooperation among consumer and producer bodies than has hitherto obtained, all to center in a single national group to foster continuous research with a minimum duplication of effort and an easy opportunity to develop international investigative activities.

effect in changing the potential of the metal when immersed in a suitable electrolyte. Much more is known about the physical properties and structure of metals than about their surface condition, but it is now definitely known that, at least in the case of the common metals, we are dealing with a film-covered surface and not with a real metallic surface.

Protective surface films are formed by reaction between the metal and its environment, usually by oxidation. The essential film-building materials may originate mainly in the metal (as in stainless steels), in the environment (as in passivation with nitric acid or chromates), or both metal and environment may contribute their share in building the film.

The stability of films has been found (by W. H. J. Vernon and U. R. Evans) to vary materially with the conditions of initial exposure. When the environment is very favorable to the formation of a dense adherent film, unusual resistance to corrosion has been obtained even with ordinary wrought iron and steel, which admittedly are vulnerable under normal conditions. This fact seems to explain the long life occasionally experienced with old wrought iron and steel. Cases have been reported in which, on removal of the initial corrosion products from well-preserved iron and steel and exposure of the clean surface to ordinary air, rust developed rapidly. The nature and stability of the metal surface film are now considered to be among the most important factors determining the course of corrosion. Local differences of potential due to concentration cells or contact with dissimilar materials may be sufficient to break down the film even on stainless steel and cause pitting.

Prevention of this "disease of metals" may be accomplished to a certain degree by: (1) changing the environment; (2) isolating the metal from destructive environment; or (3) building up the corrosion resistance of the metal. All of these methods usually are based upon the principle of forming a protective layer of some kind on the surface of the metal, which may vary from a few molecules to an applied coating ½ in. or more in thickness.

There is no panacea for prevention of corrosion. It is an economic problem and the solution in any specific case requires the best judgment of chemists and engineers working together. In some cases the first result of a thorough study of a corrosion problem has been the discard of wasteful and inefficient means of protection, followed by the development and adoption of more effective and more economical methods.

Neutralizers, Passivators, or Removal of Oxygen

WHERE the corroding medium is limited, it may be made less active by the addition of neutralizers, passivators, or by the removal of free oxygen. Much has been accomplished by such means. In the refining of corrosive crude oil, for instance, ammonia is injected to reduce corrosion due to the generation of hydrochloric acid at temperatures below 400 deg. F. At higher cracking temperatures corrosion by sulfur compounds can be held in check by the use of lime or caustic soda. One of the American Petroleum Institute committees made an extensive report in 1932 on the use of neutralizers. This method of controlling corrosion is more generally used in

A centrifugal method has been developed for applying Portland cement to the inside and outside of pipe to a thickness of ⅛ to ½ in. or more.

the low-temperature range of refinery operation. It is estimated that in the United States $3,000,000 per annum is spent for neutralizers in the refining of petroleum.

At normal temperatures industrial water can often be treated so that it will be less active and maintain a protective deposit on pipe lines without undue cost or impairing its quality for domestic purposes. It should be remembered that all chemical methods require careful control by qualified industrial chemists.

Isolating Metal from Destructive Environment

THE second method of retaining corrosion, by separating the metal from direct contact with the corroding agency, includes all kinds of protective coatings, metallic and nonmetallic, ranging in thickness from ordinary paint to portland cement concrete ½ in. or more in thickness.

An average of 120,000,000 gallons of paint per year has been used in this country during the past 10 years for the protection of iron and steel structures. Some of these paint products have been considerably improved in recent years by the use of synthetic resins, tung oil, and rubber derivatives in the paint vehicle, particularly when used for protection of material exposed to the atmosphere, but most of these materials have not proved so durable when used in water or soil. The development of paints for service under water deserves more attention. Standardized methods of tests for paint films in water should be formulated so that these products can be studied comparatively, as has been done by the American Society for Testing Materials in their atmospheric tests of paints. The results of such work would find an immediate practical use in the better protection of ship hulls, water tanks and similar construction.

Porcelain enamel and chromium plating are finding a wider field of use where galvanized coatings or paints are not sufficiently durable. None of these thin coatings, however, have proved fully adequate so far for the protection of metal in corrosive soil. The output of vitreous-enameled and chromium-plated steel products has shown a healthy increase during the past few years.

There are now in use in this country about 400,000 miles of pipe lines for the transportation of gas, oil, and water. About 10 per cent of these lines should be carefully protected with strong coatings. The corrosion damage to underground oil and gas pipe in this country has been estimated as high as $50,000,000 per year. The United States Bureau of Standards has been investigating soil corrosion for 10 years, with the cooperation of the American Petroleum Institute, American Gas Association and pipe manufacturers. The work has been in charge of K. H. Logan of the Bureau of Standards, with three associates paid by the American Gas Association, the American Petroleum Institute and the Cast Iron Pipe Research Association. Prior to July 1, 1932, 11 men were working on soil corrosion problems at the Bureau. This year, as a result of the economy program, the force was reduced to four men, including the two gas and oil technical associates. Altogether about $350,000 has been expended on this work from 1922 to date, of which about 40 per cent was contributed by the Government. This is one of the most extensive cooperative corrosion investigations undertaken so far. Unless the work is continued, much of the investment will be practically wasted.

Certain soils have been found to cause serious damage by distortion of soft bituminous coatings. As this type of coating has been used most generally, it appears that much money and material have been practically wasted for lack of information on the effect of various soils on pipe-coating materials. Bituminous coatings should be at least ⅛ in. thick to be most effective and should be stiff enough, or protected from contact with soil by suitable shielding material, to prevent distortion by soil stress.

During the past two years the materials and methods of applying coatings to pipe have been radically improved and I believe it is now safe to say that coatings capable of giving the protection desired under most soil conditions are now available at reasonable cost. Portland cement aggregates have long been used successfully for protection of pipe underground. A centrifugal method has been developed recently for the application of such material to the inside and outside of pipe to a thickness of ⅛ to ½ in. or more.

Cement has been used for 60 years on a limited scale for the lining of domestic water pipe. The use of this material is rapidly extending both for prevention of corrosion and for maintaining the carrying capacity of pipe. Some trouble has been caused by the increase in alkalinity of water in contact with new cement. To correct this condition, a portland cement mixture was recently developed in our laboratory that has about one-third the solubility of ordinary cement in water. This material is applicable particularly to the lining of water-storage tanks and water pipe.

The economics of underground pipe protection should be based on reliable data as to the useful life of bare pipe (allowing a small annual maintenance charge) compared with the life of similar pipe under the same conditions with various coatings. A pipe line company is usually not justified in spending much more for protection than would have to be set aside with compound interest to maintain the line perpetually, therefore the coatings must be comparatively low in cost except in very corrosive soils, where it may pay to spend as much as the original cost of the pipe to secure satisfactory life.

Underground pipe systems and electric cables have also been protected from ordinary soil corrosion and electrolysis, in limited areas, by lowering the electric potential of the pipe with respect to the earth, so that a current is continually impressed on the pipe from the surrounding soil. Since most of the damage on bitumen-coated pipe is at small breaks in the coating, it is more economical of electric power to first apply a bituminous coating of moderate thickness (about 1/16 in.) to pipe that is to be protected by "forced drainage," or "cathodic protection," as it is usually termed. This method of protection is most economical and effective in restricted areas where the soil has a relatively high electrical conductivity. For instance, it is employed with satisfactory results to protect the underground gas system in New Orleans.

Building Up Corrosion Resistance of Metal

WITH respect to the third method of prolonging the life of steel by increasing the resistance of the metal to the attacking media, here again for economic reasons it is very necessary to consider the increase in first cost, against the additional life, reduction of maintenance costs, and losses that may result from failures in service. In other words, the cost of corrosion-resisting ferrous alloys should be based upon the service obtained per dollar invested and not just upon the actual cost of the alloy. The estimated life of the metal need not exceed the useful life of the equipment by a large margin, so that in selecting the most economical metal or other means of protection good judgment is required in the light of all the facts.

Only a few elements (such as chromium, nickel, copper, silicon and aluminum) have been found to increase the corrosion resistance of iron. Of these chromium is most generally ef-

fective under oxidizing conditions. Other elements that have not been used so generally in ferrous alloys may be found to add to the film-building power of the metal in other environments.

In the atmosphere the addition of 0.25 per cent copper will usually double or treble the life of steel and the addition of 1 per cent chromium with copper will about double the life again and at the same time add nearly 50 per cent to the strength of the steel, so that in this case the weight and thickness may be reduced materially for certain purposes. Low-alloy steels of this type are finding a wide field of use for roofing, parts of railway cars, and other exposed structures.

Steel cars sometimes deteriorate rapidly from corrosion. A reported analysis of car repair expenditures shows that rusting is responsible for 30 per cent of the total maintenance cost, which amounts to more than $100,000,000 per year (A. F. Stuebing, THE IRON AGE, Oct. 12, 1933, page 13). J. S. Unger made a comparative test in service on 200 freight cars, each constructed of one-half ordinary steel and one-half copper steel. At the end of 13 years the copper steel showed approximately 100 per cent longer useful life than ordinary steel, with less cost of maintenance because less frequent repainting was required. This should be a highly profitable field of use for copper steel or copper-chromium steel. About 9,000,000 tons of copper steel have been produced during the past 20 years. This represents on the average a potential increase of about 100 per cent in the life of steel where the coating fails and the bare metal is exposed to corrosive atmosphere.

Unfortunately, iron and steel carrying small amounts of copper, nickel, molybdenum, chromium or other elements have not proved sufficiently durable underground or immersed in water to warrant their more general use, but there is reason to believe that a low-cost ferrous alloy may be found that will come closer to meeting these requirements. Two or more alloying elements sometimes give a more stable film than one, but the evidence now available indicates that the happy union has not been found to meet these conditions. The number of possible combinations and the length of time required for testing make the investigation of compound alloys a slow process. Furthermore, it is necessary to develop the pretreatment that will give the lowest rate of attack and the minimum tendency to pit for any particular environment. The influence of chromium on the rate and distribution of corrosion of steel in warm Pittsburgh city water has been tested. Under such conditions and within the range of composition included in the test, apparently steel with about 3 per cent chromium is preferable. The necessity for determining the maximum penetration as well as the average penetration (by loss in weight) was also illustrated by this test. Similar charts are available for a few other single additions and others are under preparation for combinations that seem to contribute the best film-building properties. These tests will have to be repeated under three or four different conditions, and then the final answer should be obtained by test of the best of these alloys in service before definite conclusions can be drawn.

Prominent in the low-alloy class of corrosion-resistant steels is the 4 to 6 per cent chromium type, which lasts four to eight times as long as carbon steel in oil-cracking tubes and has therefore displaced a considerable amount of ordinary steel in such service during the past five years.

So much has been written recently on stainless and heat-resisting steels that it is not necessary to review this important development. Suffice to say that the tonnage of these alloys has shown a decided gain during the past few years in comparison with the total tonnage of electric-furnace alloy steels, as indicated in the accompanying table taken from THE IRON AGE of Aug. 24, 1933, page 11. We estimated that about 29,000 gross tons of stainless steel were manufactured in this country in 1933. This was mostly the 18-8 chromium-nickel type, and was rolled into sheets, plates, wire and pipe for use under severe atmospheric conditions and in the chemical industries. Improvements and reduction in cost of the seamless process now make it possible to manufacture many of the ferrous alloys in the form of pipe. The modern process for manufacture of nitric acid by oxidation of ammonia was made commercially possible by the use of a large proportion of 17 per cent chromium steel in plant construction. Stainless-clad and nickel-clad steels are now available and for some purposes may prove as serviceable as the solid alloy.

Production of Electric Furnace Steel

Year	Alloy Steel, Gross Tons	Stainless and Heat-Resisting Alloy Steel, Gross Tons	Per Cent
1929	510,000	47,580	9.33
1930	300,500	53,080	17.60
1931	232,100	30,280	13.00
1932	140,870	23,770[b]	16.80

[b] Estimated.

Corrosion-fatigue is produced by the simultaneous action of corrosion and stress and may be considered as a special form of notch-fatigue in which the notch instead of being formed mechanically is formed progressively by chemical attack accelerated by applied stress. There is probably a definite endurance limit for a mechanically notched specimen under ordinary fatigue, but in corrosion-fatigue, where chemical action continues, obviously there can be no fixed endurance limit, except under certain conditions of corrosion, and a certain number of stress cycles and time of exposure. Resistance to corrosion-fatigue increases with the specific corrosion resistance of the metal to the conditions encountered, other things being equal. Under some service conditions, where the rate of stress alternation is relatively slow, it has been found that high ductility of the metal is a significant factor in minimizing concentration of stress and in delaying or preventing the formation of the sharp crevices which appear as the first stage of corrosion-fatigue.

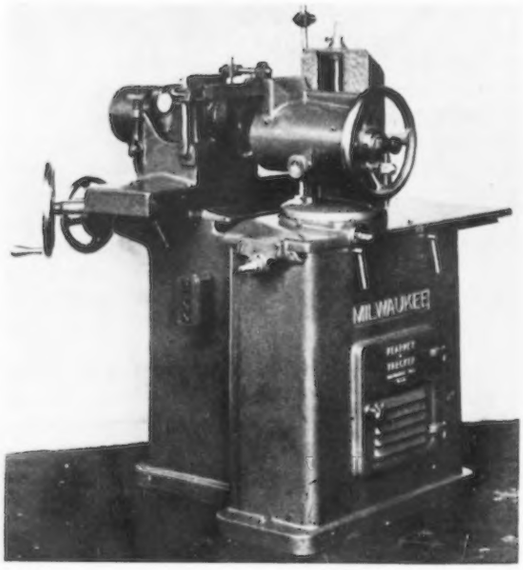
In general, the fracture of a metal part due to corrosion-fatigue may occur, at a stress far below the fatigue limit in the absence of corrosion, when the actual amount of corrosion is unbelievably small. For this reason it is particularly important to protect all parts that are subject to alternating stress, wherever practicable, even in an environment that is only mildly corrosive.

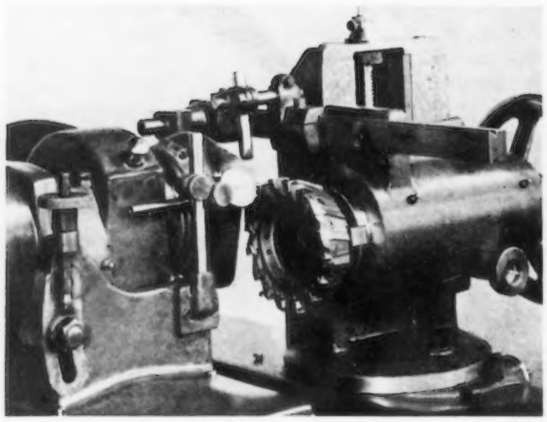
In the oil industry, where corrosion waste was very apparent several years ago, the problem has received systematic study. A preliminary survey of conditions in the oil fields and refineries in 1927 indicated an annual loss due to corrosion of about $125,000,000. In oil refining the saving due to protective measures has been estimated by engineers who have followed this problem closely as about $65,000,000 per year, which amounts to about ½ cent a gallon of gasoline produced. Several years ago this loss was figured as 1 cent a gallon.

The investigation of soil corrosion and protective coatings during the past five years has brought about almost a revolution in pipe line practice with reference to the problem of protection. Millions of dollars formerly spent every year on inadequate coatings are now being saved by omitting coatings where unnecessary and applying more suitable coatings where required.

The solution of the manifold problems included in the general term "corrosion" is hastened by proper cooperation between the consumer, who knows the precise conditions to which he is

(Continued on Page 68)





Time required for sharpening cemented carbide cutters has been markedly reduced by the Milwaukee grinder. Capacity is for face mills up to 16 in. in diameter.

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Cemented-Carbide Milling Cutters Sharpened Rapidly

A FACE MILL GRINDER basically designed for the rapid sharpening of tungsten and tantalum carbide milling cutters has been brought out by the Kearney & Trecker Corpn., Milwaukee.

Entrance of the company into the grinder field is said to have been the result of a long felt need for a grinder that would sharpen tungsten-carbide cutters fast and accurately. The excessive amount of time required for properly sharpening tungsten-carbide cutters (from three to six times as long as for high-speed steel or Stellite cutters with the same number of blades), was felt to have greatly retarded their application in many plants. With the new grinder, sharpening of a carbide cutter is said to take no longer than it formerly took to sharpen one of high-speed steel or Stellite; and, because of the strength and rigidity of the new machine, grinding time for high-speed steel and Stellite cutters has been reduced.

This new Milwaukee face mill grinder is a heavy-duty machine with capacity to sharpen all face milling cutters up to 16 in. in diameter. The bed is large and heavy. All sliding surfaces are broad and fully covered and protected to prevent wear. The spindle wheel housing and slide form a compact, rigid unit.

The cutter spindle is large in diameter and is mounted on Timken roller bearings. It has the No. 50 National standard spindle nose, the same as the milling machine, so that any cutter mounted on a style C arbor can be sharpened without removing the arbor, thus eliminating chance of error. Larger diameter cutters are bolted on to the spindle nose so that adapters are unnecessary. The cutter spindle housing is large and is mounted on a rugged upright that can be swiveled to any desired angle.

Graduated dials on all adjustment screws permit simple and accurate set-ups. A Federal jeweled-bearing dial indicator, reading to half-thousandths, is standard equipment. It is permanently mounted on the wheel-spindle slide directly in front of the operator, as shown. With this indicator it is possible to quickly check the accuracy of the finished cutter, as well as to check the cutter before grinding to see if it has been run too long and become wastefully dull.

The wheel spindle is large in diameter and is mounted on three anti-friction bearings. A massive, 55-lb. flywheel is solidly mounted on the spindle between the front and center bearings.

Because of the hardness of tungsten carbide the ordinary cutter grinder has a tendency to slow down when the abrasive wheel comes into contact with the carbide tip. This, it is stated, causes excessive wheel wear and makes uniform sharpening of blades a long and tedious operation. The inertia of the flywheel provided on the spindle of the Milwaukee grinder keeps the abrasive wheel running smoothly and maintains a uniform speed at all times. The effects are threefold: Less wheel wear, removal of a uniform amount of stock from each blade, and marked reduction in the time for completely sharpening a cutter.

A spindle brake is provided. It consists of a raybestos-lined shoe which contacts the flywheel when the operator pushes the large button mounted on the side of the spindle housing. A complete blower system can be furnished as an integral part of the machine for use in plants where a central exhaust system is not available..

The machine is provided with a 1-hp. reversible motor and a three-position push button control—start, stop, and reverse. Floor space of 4 ft. by 6 ft. is required for operation. The machine weighs 2750 lb.

Offers New Grades of Spedia Lapping Wheels

AN extra fine grade of Spedia diamond-impregnated molded bakelite lapping wheels for polishing Widia and other cemented carbides, is being announced by Thomas Prosser & Son, 15 Gold Street, New York. A taper cup wheel 3 in. in diameter, for use on cutter grinders, is available, also, in the regular lapping grade. It is stated that these additions to the line of Spedia wheels increase the range of proper resharpening of Widia and other cemented carbide tools, resulting in longer life between grinds and better finish on the work.

F. E. Barth, vice-president and assistant general manager of the Graton Knight Co., Worcester, Mass., has been named as administration member of the code authority for the used textile machinery and accessories distributing trade. Mr. Barth was formerly production engineer and cost accountant for the L. L. Harr Corpn., New York.

Welded Specimens Tested Rapidly By New Portable Machine

FOR rapid and accurate testing of welded specimens on the job, the Air Reduction Sales Co., 60 East Forty-second street, New York, is offering the compact portable tensile and bend testing machine here illustrated.

The machine consists essentially of an oil pump; a hydraulically-actuated piston or ram; two heads, one fixed and one movable, for gripping the test specimens; and four symmetrically located steel shafts, two of which transmit the piston motion and load to the movable head. The other two shafts serve to maintain the alinement of the two heads and prevent the introduction of bending stresses in the tensile test specimen.

By means of a long lever attached to the pump, and the ratio between the areas of pump plunger and hydraulic ram, the downward force on the pump lever is magnified 400 times in the load applied to the test specimen. This magnification of the force applied to the pump lever, together with the large piston displacement of the oil pump, enables specimens to be tested rapidly and with a minimum of effort.

The load on the test specimen is indicated on a special 6-in. pressure gage, carefully calibrated against a standard dead weight tester. The machine is calibrated, using clean lubricating oils covering the range of viscosities sufficient to assure that the viscosity of the oil does not materially affect the accuracy of the machine. Any good, light crankcase oil can be used. The oil chamber is provided with a filter to prevent any dust particles which may drop into it from entering the oil passages.

With a few strokes of the operating lever, after the specimen is set up, the operator can apply a direct load up to 40,000 lb. to specimens from 9½ to 10-in. long, up to ½-in. thick and up to 1½ in. wide. By using specimens of smaller cross-sectional areas than the maximum, 1½ in. x ½ in., loads equivalent to 150,000 lb. per sq. in. or higher can be applied. With these reduced size specimens the whole range of various types of steel can be tested easily and quickly.

The stroke of the movable head is up to 2¾ in., more than ample for practically any of ferrous or non-ferrous metals. Operating of the machine requires little effort, and readings are accurate to within plus or minus 2 per cent.

For bend tests the machine is provided with an anvil which fits into the movable head, and which bends the specimen against a pair of supports set 3 in. apart. These supports are cast integral with the body of the machine.

An important feature of this testing outfit is its easy portability. The solid hardwood base upon which it rests forms part of the packing case. Sides and top of the case are assembled with screws, so that by means of a screw driver the machine may be packed or unpacked quickly. The gage is carefully packed in a separate box. The entire unit, machine and case, weighs approximately 200 lb. and can he handled freely without damage to any part.

Oxy-Acetylene Cutting Blowpipe of New Design

A NEW blowpipe designed to increase the efficiency of oxy-acetylene cutting operations has been brought out by the Linde Air Products Co., 30 East Forty-second Street, New York. This blowpipe, designated as the Oxweld type C-24, weighs only 49 oz., including the nozzle, and is essentially a general-purpose tool, although a good operator can use it to cut 12-in. or even 14-in. material. It will do the majority of jobs with less oxygen pressure than previous Oxweld cutting blowpipes; 10-in. stock, for example, is said to have been cut with only 75 lb. oxygen pressure and 6-in. stock with only 45 lb. pressure. Ability to cut at such low pressures is attributed to the oxygen passageways from the blowpipe inlet to the nozzle, which have been designed to afford minimum resistance to oxygen flow.

An outstanding feature is the new cutting ogygen valve, which is designed to assure both dependability and ease of maintenance. It has a pressure-forged lever with a convenient latch on the end of it. The long lever makes the valve easy to operate with the hand in normal gripping position, and the latch permits the valve to be locked open. Internal features include use of a double-flanged rubber sleeve mounted in the valve stem, instead of the usual packing or stuffing box nuts. This rubber sleeve is said to seal more positively at both ends. Furthermore, the valve closes with instead of against the pressure; this is said to give the operator more sensitive control in cutting and to make for fast, economical work even after the valve has been in service for some time. The entire cutting valve is accessibly located on the outside of the blowpipe, so that there is no need of removing the handle to get at the working parts if replacements or maintenance should be necessary.

The chromium-plated cutting nozzles are built with the Oxweld patented seat protector, which is an extra shoulder designed to protect the seating surface of the nozzle from being marred by impact when not in the blowpipe head. The seating surface is cone shaped.

Nozzles are of refined design. The preheat orifices converge, but the angle is so slight that the nozzle can be shortened substantially without loss of efficiency. Close concentration of preheating flames is assisted by the smaller "drill circle"; that is, closer clustering of the heating orifices about the cutting oxygen opening. The careful drilling and spacing of the orifices is emphasized as making for maximum efficiency, since the speed of cutting is dependent in part upon the distance between the central jet of cutting oxygen and the small preheating flames that surround it. The C-24 nozzles give 1⅝ in. clearance from the nozzle nut to the end.

Nozzles furnished as standard are

Oxygen pressure is less than in former Oxweld cutting blowpipes.

the Nos. 4, 6, 8 and 10, which cover the whole range of ordinary cutting. A No. 12 nozzle can also be furnished.

Oxygen and acetylene inlet nipples are made of an extremely hard and wear-resisting alloy to prevent breakage of nipples and stripping of threads. The large capacity inlet needle valves are of ball type, and are interchangeable. Either a low-pressure injector or a medium-pressure mixer can be used interchangeably. The mixer is located in the rear body and can be removed conveniently.

Pressure forgings which give maximum strength with least weight are used throughout. Three of the four gas tubes are made of a high-strength brass alloy and are silver soldered at the joints. The stiffness of this stainless alloy provides increased rigidity to the tubes and head. The handle is of ribbed design.

Low-Lift Truck Has Hydraulic Lifting System

HYDRAULIC lifting system, magnetic contactor control, double reduction bevel and spur-gear-drive axle, semi-elliptic spring suspension, brakes in the wheels, and positive and automatic overload protection are features of a new 5-ton, heavy-duty low-lift truck brought out by the Mercury Mfg. Co., Chicago. A four-wheel trailing axle is employed, ball-bearing mounted, and all six wheels of the new truck, the EL model A-1010, are steering wheels.

The hydraulic lifting system consists of a high-efficiency oil pump, heavy duty piping, a hydraulic cylinder and piston, and a control valve. The hydraulic action provides smooth, easily controlled lifting and lowering, with a definite cushioning of the load and of the truck mechanism in all positions. This shock absorbing action and accuracy of control are particularly important in the handling of heavy loads.

Automatic and positive overload protection, by means of a simple relief valve which may be set for the maximum allowable load, is also provided by the hydraulic lift system. In actual use it is impossible to overload the truck, as the action of the relief valve prevents picking up more than a capacity load.

Main power contacts are furnished with large area contact fingers and the magnetic action prevents excessive arcing and the burning of contact fingers. The manual controller handles relay current only, and it is impossible for the operator to hold the power contacts in an arcing position. Other features are automatically controlled acceleration, preventing racking strains and wear and tear on the truck and drive as a result of careless handling. Acceleration is definite and automatic, giving uniformly faster operation in regular use, particularly when the truck is used frequently for a number of short runs.

The double reduction bevel and spur-gear-drive axle, ball-bearing mounted, provides a compact drive. The motor is mounted directly on the drive axle in a unit assembly. Semi-elliptic shackled springs are used in mounting the frame on the drive axle, cushioning the entire truck and the driving and braking loads.

Heavy-duty inclosed drive joints permit large steering angle. Wheel knuckles are provided with thrust and radial ball bearings for easy steering. Inclosed brakes of large area are mounted within the drive wheels.

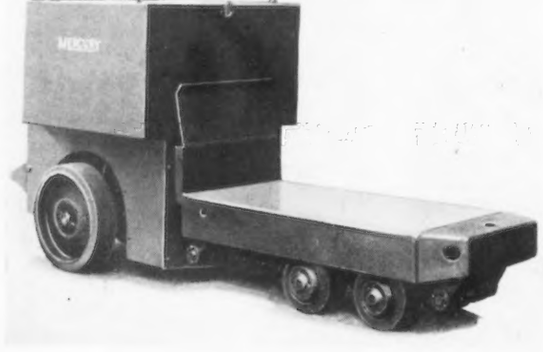
Carbide Tool Grinding And Lapping Machine

FOR sharpening cemented carbide tipped tools the Ex-Cell-O Aircraft & Tool Corpn., 1200 Oakman Boulevard, Detroit, has brought out a new model pedestal type grinding and lapping machine. A feature is the use of hardened and ground strips on the top surface of the tables, reducing wear on the surface of the tables and making it easier to keep them clean while the machine is in operation.

The tables are U-shaped and have horizontal micrometer adjustment. Two of the hardened and ground strips are mounted parallel with the face of each wheel, and two eccentric pins are placed between them to aid in alining them properly. These strips form a slot which acts as a guide for the tool support. Across the ends of each table and in front of each wheel is mounted another hardened and ground plate.

An inbuilt, balanced ¾ hp., 3450 r.p.m. motor with double-end shaft projection is mounted on top of the main casting. It is equipped with Ex-Cell-O precision ball bearings, and suitable dust caps are provided to protect the bearings from dust and dirt. A ring-type grinding wheel is mounted on a steel plate at one end of the motor. It is 6 in. in diameter with a 1¾ in. grinding surface on the side of the wheel. The special iron lapping disk of this machine is 6 in. in diameter, ¾ in. thick, and has a 1¾ in. lapping surface on the front, a ¾ in. lapping surface on the back.

An interesting cast iron pipe line for the Bayonne, N. J., water system is described in the *U. S. Piper*, a publication of the United States Pipe & Foundry Co., Burlington, N. J. The line, which is of 42-in. diameter pipe, runs through a meadow land with a muck sub-soil. Piles of yellow pipe, 18 to 38 ft. in length, were driven into the muck, a trench previously having been dug with a clamshell bucket. The piles, in two rows, were capped with reinforced concrete bents 2½ ft. square and 5 ft. long, spaced 12 ft. apart. The bents form saddles on which the pipe rests.



(At right)—Use of hardened and ground strips on top of the tables is a new feature of this carbide tool grinder and lapper.

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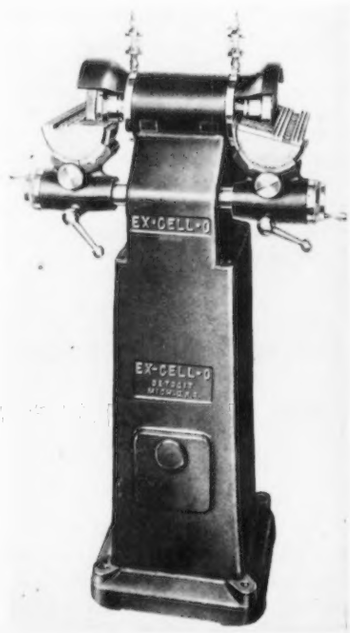
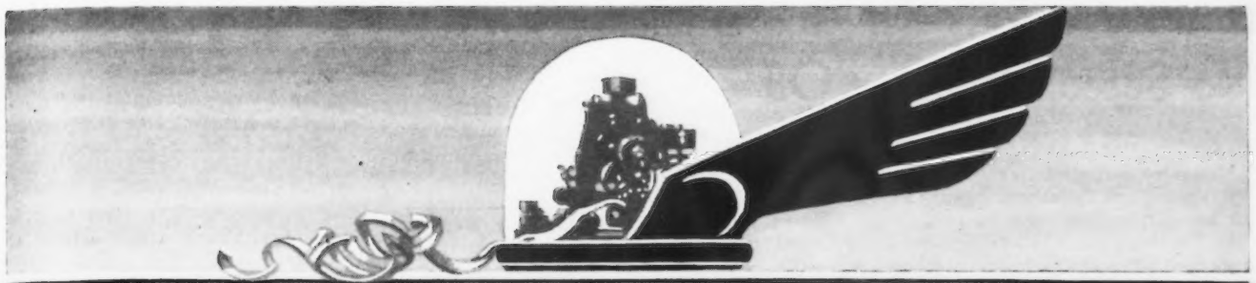
(At left)—The hydraulic system provides smooth and easily controlled lifting and lowering.





THE NEWS OF THE WEEK

Steel Corporation Shipments Nearly 16 Per Cent Higher During May

MAY shipments of finished steel products by the United States Steel Corpn. amounted to 745,063 tons, an increase of 15.9 per cent over the preceding month when the movement was 643,009 tons. In May of last year the corporation's shipments totaled 455,302 tons. The figure last month was the highest since May, 1931, and was equivalent to 44.4 per cent of the corporation's capacity for the 27 working days available.

MONTHLY SHIPMENTS OF STEEL PRODUCTS BY UNITED STATES STEEL CORPN.

				1933		1934	
Month	1930	1931	1932	Shipments	Per Cent of Capacity	Shipments	Per Cent of Capacity
January	1,104,168	800,031	426,271	285,138	17.7	331,777	19.8
February	1,141,912	762,522	413,001	275,929	18.5	385,500	26.3
March	1,240,171	907,251	388,579	256,793	15.3	588,209	36.6
April	1,188,456	878,558	395,091	335,321	21.6	643,009	41.5
May	1,203,916	764,178	338,202	455,302	27.1	745,063	44.4
June	984,739	653,104	324,746	603,937	37.4	.....	...
July	946,745	593,900	272,448	701,322	45.1	.....	...
August	947,402	573,372	291,688	668,155	39.8	.....	...
September	867,282	486,928	316,019	575,161	35.6	.....	...
October	784,648	476,032	310,007	572,897	35.5	.....	...
November	676,016	435,697	275,594	430,358	26.7	.....	...
December	579,098	351,211	227,576	600,639	38.7	.....	...
Plus yearly adjustment	(40,259)	(6,040)	(5,160)	(44,283)	...	.....	...
Total for year	11,624,294	7,676,744	3,974,062	5,805,235	30.1	.....	...

Weirton Employees Opposed to Strike

OVER 95 per cent of the workers in the Weirton, W. Va., and Steubenville, Ohio, plants of the Weirton Steel Co. are opposed to a strike, according to a poll conducted this week among the more than 10,000 employees of the two plants. A similar poll at the company's Clarksburg, W. Va., plant is under way. Results of the poll were disclosed in advertisements published in Weirton and Steubenville newspapers over the signatures of 44 representatives elected by the employees to represent them in relationships with the Weirton company.

Only 460 employees, or less than 5 per cent, stated that they approved of the proposed walkout set for June 16 by officials of the Amalgamated Association of Iron, Steel and Tin Workers. Definitely opposed to the strike were 9801 workers. The results of the poll are interpreted by the employees' representatives as overwhelming proof that the vast majority of the workers in the Weirton plants are satisfied with the method of collective bargaining provided in the employees' representation plan now in effect.

Bar Iron Wage Conference Adjourns

A BAR iron wage conference was held by the Western Bar Iron Association and a committee of the Amalgamated Association of Iron, Steel and Tin Workers in Cleveland, June 6 and 7, to consider a new wage scale to cover the year starting July 1 when the present scale expires. Wage and working condition demands were presented by the Amalgamated wage committee. The meeting adjourned without reaching any agreement, as President M. F. Tighe of the Amalgamated association was called to Washington. The conference will be resumed at a later date. Under the terms of the present agreement if a new wage scale is not adopted the men will be required to continue at work at the old scale at least 30 days after the expiration of their scale year on June 30.

New Blast Furnace Lighted in England

THE first new blast furnace at the Corby Works of Stewarts & Lloyds, Ltd., near Kettering, England, was lighted on May 8. The ceremony was attended by the directors and officials of the company and its consulting engineers, H. A. Brassert & Company, Ltd., of Chicago and London. The No. 1 furnace is the first unit of the new enterprise to be put into commission, and it has been designed and built for its special work to the specification of, and under the personal supervision of, H. A. Brassert. It is the first of its type in Great Britain, and embodies new features in its lines, its armament, its cooling system and its charging and hot blast equipment. A somewhat larger unit, No. 2 furnace, is now under construction, and will, it is expected, be put into commission in the autumn. The two new units, Nos. 1 and 2, replace the two old small furnaces now dismantled, and they will supply iron for the new Corby Steel Works, which will be ready for production toward the close of the year. The new plant will be the first steel plant to be established on the Northamptonshire orefield, and will manufacture steel by the basic Bessemer process.

A. Levine & Co., 1475 South State Street, Chicago, dealers in iron and steel scrap, particularly pipe and structural material, have changed name to the Clonick Steel Co.

British Markets Are Experiencing No Seasonal Falling Off

LONDON, ENGLAND, June 12 (*By Cable*).—British iron and steel shows no seasonal lull, and further expansion even is probable. Pig iron output is being easily absorbed, although new contracts are on a hand-to-mouth basis. Renewal period contracts are imminent. Heavy deliveries are going to Scotland owing to the Clyde shipbuilding revival, but exports are dull. Hematite makers are heavily booked and are reluctant to sell forward.

Steel makers are well employed, particularly rail mills, and heavy bridge and structural work is coming out. Large shipments are going to China, Finland and Denmark, and further substantial contracts have been booked. Fewer Continental offers of half-finished steel are being made owing to losses incurred by selling at low prices.

British firms hope to secure contracts for new barrage in Nile Delta costing £2,500,000 and also for strengthening Assiout barrage costing £1,500,000.

Uncertainty in international agreements is obstructing expansion in tin plate demand. Good deliveries for home and export are being made but new business is quiet. Slight improvement in Continental iron and steel markets is maintained, particularly on half-finished and merchant steel, but plates and sheets are dull. British steel makers are meeting a committee of the Continental Steel Cartel in London on June 14 to discuss prospects of joining. The International Rail Cartel is meeting in London, June 14 and 15.

British Prices, f.o.b. United Kingdom Ports

Per Gross Ton

Ferromanganese, export	£9			
Billets, open-hrth.	£5	10s.	to £5	15s.
Tin plate, per base box		17s.	3d. to	17s. 6d.
Steel bars, open-hearth	£7	17½s.		
Beams, open-hrth.	£7	7½s.		
Channels, open-hearth	£7	12½s.		
Angles, open-hearth	£7	7½s.		
Black sheets, No. 24 gage	£9	5s.		
Galvanized sheets, No. 24 gage	£11	5s.		

Official Continental Prices, f.o.b. Continental Ports

Per Metric Ton, Gold £

Current dollar equivalent is ascertained by multiplying gold pound price by 124.14 to obtain franc equivalent and then converting at present rate of dollar-franc exchange.

Billets, Thomas	£2	7s.	
Wire rods, No. 5 B.W.G.	£4	10s.	
Steel bars, merchant	£3	5s.	
Sheet bars	£2	8s.	
Plates, ¼ in. and up	£4		
Plates, 3/16 in. and 5 mm	£4	2s.	6d.
Sheets, ⅛ in.	£4	7s.	6d.
Beams, Thomas	£3	2s.	6d.
Angles (Basic)	£3	2s.	6d.
Hoops and strip base	£4	2s.	6d.
Wire, plain, No. 8	£5	7s.	6d.
Wire nails	£5	15s.	
Wire, barbed, 4-pt. No. 10 B.W.G.	£8	15s.	

Organize Streine Mill Equipment Co.

THE Streine Mill Equipment Co., 9 North Franklin Street, New Bremen, Ohio, has been organized to manufacture straight and rotary shear knives, shears for all purposes, high productive roll corrugating machines, corrugating and forming presses, roofing dies, etc.

Frank H. Streine, who was for many years general manager of The Streine Tool & Mfg. Co., is president and general manager and C. L. Streine is secretary-treasurer.

Most Beautiful Bridges Of 1933 Are Selected

THE three most beautiful steel bridges built last year are the Cedar Street Bridge over the Illinois River at Peoria, Ill.; the Shark River Bridge between Belmar and Avon, N. J., and the Dr. John D. McLoughlin Bridge at Portland, Ore., according to a jury of nationally-known architects and engineers, and will receive the sixth annual award of the American Institute of Steel Construction. They will be decorated with stainless steel placques at unveiling ceremonies to be planned later in the summer.

The Cedar Street Bridge at Peoria was fabricated and erected by the McClintic-Marshall Corpn. It was judged the most beautiful in Class A, which included bridges costing more than a million dollars. The South Tenth Street Bridge over the Monongahela River at Pittsburgh was given honorable mention in this same class.

The Shark River Bridge on the Jersey shore was fabricated and erected by the American Bridge Co. It was judged the most beautiful among bridges of medium size, costing less than a million and more than a quarter million dollars. The Shrewsbury River Bridge at Seabright, N. J., fabricated and erected by the same company, was given honorable mention in the same class.

The Dr. John D. McLoughlin Bridge over the Clackamas River at Portland was selected as the most beautiful of the small bridges. This was fabricated and erected by Poole & McGonigle of Portland. The Port Clinton Bridge over the Portage River at Port Clinton, Ohio, was granted honorable mention.

The jury making these awards consisted of Dr. Gustav Lindenthal, consulting engineer, New York; Prof. C. T. Schwarze of the college of engineering, New York University; Philip Sawyer, of York & Sawyer, architects, New York; Prof. Ralph E. Winslow of the department of architecture, Rensselaer Polytechnic Institute, Troy, N. Y., and Mr. Russell F. Whitehead, editor of *Pencil Points*, New York.

Report on Machinery Patent Suit

A REPORT has been filed on a patent infringement suit brought by the National Machinery Co., Tiffin, Ohio, against the Ajax Mfg. Co., Cleveland, in 1932 by the special master to whom it was referred by the United States District Court in Cleveland. The report holds that the extension header slide and die slide of a new line of air clutch forging machines brought out by the Ajax company do not infringe on United States Patents Nos. 1,297,101 and 1,683,956 held by the National Machinery Co., and also holds that both patents are invalid.

Living Costs Again Move Upward

THE upward movement in living costs of industrial wage-earners, which was interrupted in April, was resumed in May with a rise of 0.3 per cent, according to the monthly index computed by the National Industrial Conference Board. The increase was due entirely to advances in food prices and rents. In May, 1934, the cost of living was 9 per cent higher than in May, 1933, but 20.5 per cent lower than in May, 1929.

The Bureau of Supplies and Accounts, Navy Department, is asking for bids June 22 on 112 tons of black plates for stock at the Puget Sound navy yard. On June 29 the bureau will open bids for 185 tons of steel forgings for shafting for seven coast guard cutters for delivery at the Charleston, S. C., Brooklyn and Philadelphia navy yards.

... PERSONALS ...

R. S. ARCHER has joined the staff of Republic Steel Corpn. as chief metallurgist of the Chicago district. E. LARNED remains as assistant chief metallurgist at Chicago. Mr. Archer has been director of metallurgy of the A. O. Smith Corpn., Milwaukee, and prior to that was in charge of the Cleveland section of the Aluminum Research Laboratories of the Aluminum Company of America. He is a graduate of the University of Michigan, author of numerous scientific papers and co-author with Dr. Zay Jeffries of "The Science of Metals."

Mr. Archer is a past-chairman of the Cleveland section of the American Society for Metals and for some years has been a member of the recommended practice committee of that society. He is also chairman of the committee of data sheets of the Institute of Metals Division of the American Institute of Mining and Metallurgical Engineers.

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V. A. OLSEN has been appointed works manager of the Cadillac Motor Car Co., Detroit, division of General Motors Corpn. He began his career with the Cadillac company 16 years ago in the tool designing department, rapidly rising to the position of assistant superintendent of tools and equipment. Later he was made superintendent of that department. Two years ago he was appointed assistant works manager. C. A. RAFTREY has been made assistant to Mr. Olsen.

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E. S. MCCLELLAND, director of personnel, Westinghouse Electric & Mfg. Co., East Pittsburgh, has retired after 53 years' continuous service with the company. In seniority, outranking all other veterans of the company, Mr. McClelland started with the company in 1881 at the age of 17 as a helper in the foundry of the Westinghouse Machine Co. He advanced to the pattern shop, production department, drafting department and engineering department, later becoming successively assistant chief engineer, assistant general superintendent and works manager. In 1920 he was appointed director of personnel. He has been an active member of the American Society of Mechanical Engineers, American Management Association, Electrical Manufacturers Council, and the Pittsburgh Personnel Association. In honor of his retirement Mr. McClelland was feted by F. A. Merrick, president, and veteran employees of the Westinghouse company.

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C. W. YOUNG has been appointed general superintendent in charge of all productive operations of the Buick Motor Co., Flint, Mich., division of General Motors Corpn. He joined the Buick organization in 1907, coming to Flint from Utica, N. Y., at the time the Weston-Mott Co. became part of the Buick company. In 1916 he was made general foreman of factory No. 31, where he served for six years. He then was made factory manager of plant No. 4, and in 1926 became superintendent of the Buick motor plant.

R. S. ARCHER

V. A. OLSEN

ARTHUR T. BRABYN has been made general master mechanic of the Buick Motor Co., replacing WAYNE H. EDDY, resigned. Mr. Brabyn, in his early years, was with the Flint Wagon Works, Flint, Mich., and in 1908 joined Buick as a draughtsman. He later became chief draughtsman and then assistant master mechanic in the motor plant, serving in the latter capacity for more than eight years. Two years ago he was made assistant general master mechanic.

F. C. PYPER, formerly general tool supervisor of the Buick Motor Co., has been appointed assistant general master mechanic. He first became associated with Buick in 1916 as foreman of tool grinding, and for 12 years was tool supervisor of the engine plant. During the last two years he has been general tool supervisor of all the Buick factories.

A. R. MIDDLETON has been made assistant superintendent of the motor plant of the Buick company.

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EDWIN W. JEFFERY and EDWIN J. GILLES have organized Jeffery-Gilles, Inc., Cleveland, as a sales organization for machine tools. They will act as direct factory representatives in the Cleveland territory for the Hendey lathes, shapers and centering machines and for Reed-Prentice vertical milling, die sinking and die casting machines. They have opened office in the Caxton Building. Both Mr. Jeffery and Mr. Gilles for a number of years have been connected with the machinery sales department of the W. M. Pattison Supply Co., Cleveland.

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H. A. ANDERSON, Western Electric Co., Chicago, was elected chairman of the Chicago chapter of the American Society for Metals at the recent annual meeting of the chapter. H. B. KNOWLTON, International Harvester Co., was elected vice-chairman and K. H. HOBBIE, Driver-Harris Co., was elected secretary-treasurer.

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EDWARD E. GILL, general production manager and manager of the Bristol, Conn., plant of the New Departure Mfg. Co., has been made a director of that company.

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ISHAM KEITH, formerly with the Bethlehem Steel Co., has been appointed to the code authority for the screw machine products manufacturing industry. Mr. Keith, a graduate of Lehigh University, has been employed also by the Western Electric Co., MacBeth Daylighting Co., New York Telephone Co., and Pratt & Whitney Co., Hartford, Conn.

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FRED T. H. YOUNGMAN, who for the past 15 years has been secretary-treasurer of the Jessop Steel Co., Washington, Pa., has been appointed vice-president. He will continue as treasurer. R. J. MURRAY, II, assistant secretary for the last six years, has been made secretary.

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ARTHUR SIMON, in charge of alternating current engineering for Cutler-Hammer, Inc., Milwaukee, from 1903 to 1921, and since that time a consultant, was conferred the honorary degree of Doctor of Science by Marquette University, Milwaukee, on June 13, during the annual commencement exercises. He was cited as a

foremost figure in electrical engineering in the United States and holds approximately 40 patents. He has previously been honored by several American and German engineering groups. Mr. Simon is a native of Ebersheim, Germany, where he received his earlier technical training.

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EMMETT B. CARTER, formerly vice-president and works manager of the Delaware Floor Products Co., and identified with the Midvale Co. from 1904 to 1922, has been named Administration member to the code authority of the wood screw manufacturing and the machine screw nut industries.

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R. L. RICKWOOD has been appointed works manager, Reed-Prentice Corpn., Worcester, Mass. He was formerly connected with the Worthington Pump & Machinery Co. and the Cincinnati-Bickford Tool Co.

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DR. BRUCE W. GONSER has been made a member of the technical staff of Battelle Memorial Institute, where he will be placed on the research program sponsored by the International Tin Research & Development Council of London, England.

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JOHN C. HOPKINS, formerly associated with the Central furnace division of the American Steel & Wire Co., Cleveland, since 1922, as superintendent of Central furnaces and since 1929 general superintendent of blast furnaces and steel plants, has been appointed district sales manager of the Cleveland office of the General Refractories Co., Philadelphia.

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H. P. CLAWSON has been placed in charge of the New York office, with headquarters at 51 East Forty-second Street, of the Macleod Co., Cincinnati, maker of abrasive blast and dust arrester equipment.

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VICTOR CROSBY, heretofore foundry metallurgist for the Studebaker Corpn., has joined the metallurgical staff of the Climax Molybdenum Co. as foundry metallurgist and will make his headquarters in Detroit.

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EDWARD C. GAINSBORG, who was at one time sales manager of the Roller Bearing Co. of America, Trenton, N. J., has returned to the company as general manager.

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J. B. KNIGHT, J. T. Knight & Son, Inc., Columbus, Ga., was elected president of the Southern chapter of the Institute of Scrap Iron and Steel, and A. COHEN, Lynchburg Iron & Metal Co., Lynchburg, Va., was elected chairman of a regional code committee, at a conference of scrap iron dealers held June 6, at Atlanta.

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LOUIS C. LUSTENBERGER, who has long been identified with the sales staff of Carnegie Steel Co., Pittsburgh, has been appointed assistant to C. V. MCKAIG, vice-president and general manager of sales, and has been assigned to special sales duties, effective June 1.

Officers Named By Blast Furnace Association

AT the spring meeting of the Eastern States Blast Furnace and Coke Oven Association at the Pittsburgh Field Club, Pittsburgh, on June 8, the following officers were elected for the year: President, C. P. Clingerman, superintendent, Carrie blast furnaces, Carnegie Steel Co., Rankin, Pa.; vice-president, John C. Murray, assistant general superintendent, Jones & Laughlin Steel Corpn., Pittsburgh; and secretary-treasurer, F. T. Moran, superintendent of coke ovens plant, Republic Steel Corpn., Warren, Ohio.

Steel Warehouse Group Will Meet in New York

THE American Steel Warehouse Association will hold its twenty-fifth annual meeting at the Hotel Commodore, New York, on June 27. A number of questions of importance to steel warehouse distributers will be discussed and Walter S. Tower, executive secretary of the American Iron and Steel Institute, will address the morning meeting on the subject of the revised steel code. B. R. Sackett, 505 Arch Street, Philadelphia, is secretary of the association.

Tests Show Value of Slow Cooling of Rails

PRELIMINARY results of a study now in progress at the Bureau of Standards, Washington, indicate that a recently developed industrial process for slowly cooling steel rails through the blue heat temperature range is effective in preventing "shatter" cracks.

If these findings are borne out in service, a real contribution to safety will have been made, because every "shattered" rail which finds its way into service is a potential source of accidents, according to H. S. Rawdon, chief of the bureau's metallurgical division.

In this study, residual stress measurements were made on 8-in. lengths from each of two rails from the same ingot, one cooled normally after rolling and the other cooled slowly in accordance with the new process. Six longitudinal specimens, ½ in. square in cross sections, were cut from the head, web and base of each of the 8-in pieces. The bars from the center of the head of the normally cooled rail increased in length when isolated from the head, whereas similar bars from the slowly cooled rail decreased in length. The head of the normally cooled rail contained numerous "shatter" cracks but the slowly cooled rail was free from "shatter."

The results, it is pointed out, are interpreted as indicating that tensile stresses are normally produced in the central part of the head of a rail as it cools, and that in the "shattered" rail the tensile stresses were relieved when the "shatter" cracks formed.

Oppose Changes in Bituminous Code

MANY large consumers of coal are concerned over the proposed amendment to the bituminous coal code. This amendment provides for the proration of coal output among mine operators on the basis of their peak production in any one of the five years, 1929 to 1933, inclusive. Producers who exceed their quota suffer the penalty of a stipulated sum (25c. a ton is the figure being considered) for tonnage produced in excess of quota, with a like compensation per ton to mine operators who fail to produce their quota.

Both of these provisions will tend to increase coal prices materially. The effect of proration is to limit the production of lower-cost, more efficient mines and to subsidize, at the expense of coal consumers, the higher-cost mines, of which there are many in the bituminous coal industry.

The McClintic-Marshall Corpn. will hereafter operate on the Pacific Coast under the name of the Pacific Coast Steel Corpn. E. F. Gohl has been appointed as vice-president of the Pacific Coast Steel Corpn. and will be in direct charge of the fabricating division. He will make his headquarters at Twentieth and Illinois Streets in San Francisco.

The International Harvester Co. has completed the installation of a Lectromelt furnace for making special high strength gray iron and steel products at its tractor works, Cicero, Ill. This furnace has a capacity of 1000 lb. per heat and has just been put into regular operation.

April Steel Exports Remain at High Level

Exports of Iron and Steel from the United States

(In Gross Tons)

	April		Four Months Ended April	
	1934	1933	1934	1933
Pig iron	310	335	1,148	1,003
Ferromanganese	6	...	14	...
Scrap	126,687	64,774	463,008	192,240
Pig iron, ferroalloys and scrap	*127,003*	*65,109*	*464,170*	*193,243*
Ingots, blooms, billets, sheet bar	260	245	2,160	494
Skelp	1,042	512	4,927	990
Wire rods	1,795	1,488	11,176	4,382
Semi-finished steel	*3,097*	*2,245*	*18,263*	*5,866*
Steel bars	4,828	1,593	14,613	5,291
Alloy steel bars	343	105	1,241	345
Iron bars	51	36	246	129
Plates, iron and steel	3,734	232	11,160	1,309
Sheets, galvanized steel	4,454	2,178	21,271	8,732
Sheets, galvanized iron	105	40	506	142
Sheets, black steel	7,134	1,572	24,988	8,367
Sheets, black iron	449	132	1,097	534
Hoops, bands, strip steel	3,109	1,102	10,932	4,754
Tin plate, terne plate	11,496	3,501	76,390	14,233
Structural shapes, plain material	3,365	680	7,291	2,289
Structural material, fabricated	1,348	1,247	6,469	3,619
Tanks, steel	392	104	3,278	720
Steel rails	8,448	1,633	35,578	4,816
Rail fastenings, switches, frogs, etc	870	191	9,187	817
Boiler tubes	639	290	2,062	1,411
Casing and oil line pipe	4,844	3,163	19,838	9,237
Pipe, black and galvanized, welded steel	4,405	1,436	15,875	6,519
Pipe, black and galvanized, welded iron	111	98	578	385
Plain wire	2,630	567	12,364	2,028
Barbed wire and woven wire fencing	3,184	1,111	12,076	5,469
Wire cloth and screening	67	42	224	183
Wire rope	339	141	963	565
Wire nails	1,461	431	4,593	1,993
Other nails and tacks	507	221	1,741	1,075
Horseshoes	21	23	50	30
Bolts, nuts, rivets and washers, except track	451	282	1,568	1,020
Rolled and finished steel	*68,785*	*22,151*	*296,179*	*86,012*
Cast iron pipe and fittings	429	421	4,475	1,769
Malleable iron screwed fittings	214	127	1,009	578
Car wheels and axles	262	228	1,265	1,684
Iron castings	472	94	2,806	810
Steel castings	426	28	641	223
Forgings	345	283	1,206	959
Castings and forgings	*2,148*	*1,181*	*11,402*	*6,023*
All other	506	359	2,001	1,073
Total	201,539	91,045	792,015	292,217

Imports of Iron and Steel Products into the United States

(In Gross Tons)

	April		Four Months Ended April	
	1934	1933	1934	1933
Pig iron	8,253	17,875	51,590	42,015
Sponge iron	127	10	321	63
Ferromanganese and spiegeleisen*	2,671	2,223	9,874	8,425
Ferrochrome†	...	16	20	21
Ferrosilicon‡	55	....	146	4
Other ferroalloys	....	...	....	1
Scrap	5,214	149	16,773	1,090
Pig iron, ferroalloys and scrap	*16,320*	*20,273*	*78,724*	*51,619*
Steel ingots, blooms, etc.	35	21	335	92
Wire rods	1,208	542	4,119	3,673
Semi-finished steel	*1,243*	*563*	*4,454*	*3,765*
Concrete reinforcement bars	26	150	327	901
Hollow steel bars	70	94	242	329
Merchant steel bars	2,074	951	5,392	5,933
Iron bars	158	18	247	72
Iron slabs	....	...	1	1
Boiler and other plate	....	16	49	82
Sheets, skelp and saw plate	672	812	1,879	4,133
Tin plate	2	35	30	161
Structural shapes	1,821	1,920	6,135	7,358
Rails and rail fastenings	321	63	898	394
Welded pipe	107	111	692	1,179
Other pipe	375	159	1,483	424
Barbed wire	855	456	3,195	4,072
Round iron and steel wire	224	244	870	992
Flat wire and strip steel	131	46	486	242
Wire rope and strand	154	145	532	525
Other wire	61	261	220	665
Hoops and bands	1,423	1,031	4,559	5,304
Nails, tacks and staples	615	323	2,174	2,508
Bolts, nuts and rivets	48	37	119	89
Other finished steel	47	116	115	227
Rolled and finished steel	*9,184*	*6,988*	*29,645*	*35,591*
Cast iron pipe and fittings	....	164	3	228
Castings and forgings	115	73	489	315
Total	26,862	28,061	113,315	91,518

*Manganese content only.
†Chromium content only.
‡Silicon content only.

EXPORTS of iron and steel products from the United States for April, as compiled by the Iron and Steel Division of the Department of Commerce, while showing a slight recession from March of this year, remained at a comparatively high level. The total for April, as announced in THE IRON AGE last week, was 201,359 gross tons as compared with 261,269 gross tons in the previous month and with 91,045 gross tons in April of last year.

Details of the breakdown of exports as well as imports of steel products for April are now available and are given in the accompanying tables.

Of a total of 126,687 tons of scrap exported from this country, 55,113 tons were taken by Japan, which country also took 1591 tons of wire rods out of a total of 1795 tons exported. This made Japan our leading export customer for iron and steel for the month with a total of 58,962 gross tons. Canada was second with 27,594 gross tons requirement and the United Kingdom third with 24,467 tons.

Brazil was our best customer abroad for heavy rails, taking 3699 tons out of a total of 7916 exported. China was the best taker for tin-plate, with Argentina, Brazil and Japan following in close order.

Imports of iron and steel products into the United States in April totaled 26,862 tons compared with 38,393 tons in March and 28,061 tons in April, 1933. Pig iron was the principal item imported, the bulk of which originated in the Netherlands.

Sources of American Imports of Iron and Manganese Ores

	April		
	Iron Ore		Manganese Ore
	1934	1933	1934
Canada	....	....	....
Cuba	....	....	....
Chile	108,808	....	....
Spain	....	....	....
Sweden	....	....	....
French Africa	4,250	....	....
Russia	8,500	8,000	13,568
India	....	....	771
Brazil	....	....	4,100
West Africa	....	....	876
Other countries	6,002	*6,762	398
Total	127,560	14,762	19,713

* Imported from Norway.

United States Imports of Pig Iron by Countries of Origin

(In Gross Tons)

	April		Four Months Ended April	
	1934	1933	1934	1933
United Kingdom	....	800	100	950
British India	871	10,803	13,115	20,431
Germany	....	....	....	134
Netherlands	6,609	5,707	34,077	15,684
Canada	199	....	3,099	419
France	....	....	....	....
Belgium	....	....	50	....
Norway	402	....	402	....
Sweden	....	....	200	2,803
All others	172	565	547	1,628
Total	8,253	17,875	51,590	42,049

THIS WEEK IN WASHINGTON

NRA Strives To Prevent Steel Strike

Industry's Proposal To Establish Industrial Relations Board Believed Satisfactory To All But Militant Minority in Union

By L. W. MOFFETT
Resident Washington Editor, The Iron Age

WASHINGTON, June 12.—Decision to strike or accept an Industrial Relations Board to negotiate labor disputes is expected to be reached Thursday in Pittsburgh at the convention of the Amalgamated Association of Iron, Steel and Tin Workers.

Washington is anxiously awaiting the outcome of a vote at the convention and thinks it rests upon the relative strength of the militant and more conservative groups in the union. For there is a split within the ranks, despite the more of less temporary "unification" of forces for purposes of dealing with Government officials at the numerous and occasionally turbulent conferences in Washington last week. The wind-up of the multifarious meetings and raging statements reflected the differences.

The bitter-enders among the steelworkers, including William A. Spang and E. J. Forbeck, with 14 others, just before their return home from Washington Saturday night, addressed an open letter to President Roosevelt vigorously attacking General Johnson, terming the proposed board an insult to the steelworkers and demanded that it be thrown "into the waste basket." This letter was not signed, as previous communications of the more militant members of the Rank and File Committee were not signed, by President M. F. Tighe and others of the more conservative officials of the association. Mr. Tighe has on different occasions repudiated actions of these militant leaders, though assuming a fighting tone himself as the convention date approached. Nevertheless, it is not believed Mr. Tighe and his group want a strike. Moreover, it is thought that they represent the majority of the association membership.

Johnson Comparatively Restrained

General Johnson's reply to the letter was comparatively restrained for the administrator, though it branded as an "unvarnished lie" the charge in the steelworkers' open letter that the General in a broadcast last Friday night called them communists. The facts of the matter are that the General got his wires crossed. His attack on steelworkers was intended to be directed at the out-and-out communistic group known as the Steel and Metal Workers Industrial Union. The General thought it was this group which expressed the wish to see his pants scorched before an open-hearth furnace. Actually the wish was expressed by Mr. Spang in one of the many blustering tirades he issued to a surprisingly eager press.

This impasse between General Johnson and the Spang-Forbeck group nevertheless has created considerable concern as to its effect on the strike situation. Even many friends of General Johnson think his remarks about steelworkers in his broadcast were highly intemperate and inept, especially in view of the fact they were delivered when action on the board set-up was pending.

Meanwhile, the steel industry finds itself waiting to see whether or not the board, whose machinery is understood to have been jointly drafted by General Johnson and the American Iron and Steel Institute, will be accepted at the Pittsburgh convention. Mr. Tighe has neither said it would be accepted or rejected. He made it clear that only the convention can determine the question. Its rejection by the Spang-Forbeck group was expected. This group came to Washington with all sort of demands, attacked Government official after Government official because their demands were not yielded to on the spot, and made different but unsuccessful efforts to see the President in order to harangue him. The open letter they finally addressed to him was sent when the President was on a cruise down the Potomac River.

It is now a question whether the militant group or the more conservative group has the ascendancy in the Amalgamated association. The belief here is that the great bulk of the members want to avert a strike. Even though they so voted it would not be a surprise to Washington if some of the militants bolted the convention and attempted to stir up trouble.

Confusion in Proceedings

Much confusion has surrounded the conferences on the steel strike situation. Even now such a supposedly simple thing as the purpose of the Pittsburgh convention is not definitely known. General Johnson says the purpose is to decide whether or not it will accept or reject the proposed board to be set up in the steel industry. This is expected to be done. But Mr. Tighe declares that the "express purpose is to consider and make

final arrangements" for carrying out the purposes of the April convention of the Amalgamated association which through a resolution demanded union recognition, a 6-hr. day, 5-day, 30-hr. week, with a minimum of $1 per hour. Acceptance of this proposal obviously has been declared by the steel industry to be out of the question. General Johnson has also said as much. The more conservative group knows it has not the slightest chance of acceptance. It is the peg on which the Spang-Forbeck group hung its "arguments." Neither the hours nor wages would be accepted by the industry and much less would union recognition be granted. For the proposed board does not mean union recognition though it marks a wide step in new relations between the steel industry and labor.

Board Proposed By Industry

The formal acceptance of the joint proposal of General Johnson and the American Iron and Steel Institute for the creation of a three-man Industrial Relations board within the iron and steel industry was conveyed last Friday to General Johnson through President L. E. Block of the Inland Steel Co., President E. G. Grace of the Bethlehem Steel Corpn., and President W. A. Irvin of the United States Steel Corpn., as a subcommittee named by the Institute.

The purpose of the board would be "to pass upon questions arising with respect to the collective bargaining provision of the National Recovery Act." The agreement does not involve "recognition" of any labor faction, organized or unorganized, but calls for the selection by the President of three men, one each to represent employer, employee and the public.

None of the members would have "interest in or partisan relationship toward employees or in or toward employers in the steel industry or any company therein or in or toward any labor organizations whether national or local." The board would adjudicate all complaints of discrimination against unions, employers would abide by its findings on discrimination, permit it to supervise company union elections or amend the union's structure upon demand of a substantial number of workers, accept its findings as final respecting who are the chosen representatives of the employees, accept its arbitration when a case is jointly submitted, produce payrolls or other records and allow the board freely to order new elections if any held since Jan. 1, 1934, are found to have been under employer restraint.

The point was made by General Johnson, in explaining the plan, that the door is left open to the Amalgamated association to take control of the collective bargaining machinery wherever it commanded a majority and voted its own officers as representatives to bargain for its members. General Johnson said the plan also would permit employees, if they chose, to eliminate company unions and to elect in their place an independent outside organization.

Board Would Have Important Rights

It is the opinion of General Johnson that the most significant point in the proposal is that giving the board the right to supervise any employe representation election or to amend plans, when called upon to do so either by the employer, the committee in charge of the election or upon written request signed by a substantial percentage of eligible voters. The industry would be required to respect the determination of the board as to who are the freely chosen representatives for the purpose of collective bargaining. General Johnson took occasion to correct the impression that this paragraph constituted recognition. Rather, he said, it determined the question of representation to be "respected" by the industry. The General said "recognition," as he understands the term, merely means a man sitting at a table recognizes the other as a representative of a group.

Charles E. Adams, who as announced in THE IRON AGE last week, took up his duties June 1 as NRA Division Administrator No. 1, and who has charge of the steel and other major codes. He succeeds K. M. Simpson, resigned. He is president of the Air Reduction Co., New York, and a director of the Vanadium Corpn. of America; chairman, United States Industrial Alcohol Co., the Pure Carbonic Co. of America, and the National Carbide Corpn. He recently has been a deputy administrator in charge of finance and insurance codes.

Originally, it is said the institute proposed a five-man board, but it was later modified and pared down to a three-man board. Nathan R. Miller, general counsel for the United States Steel Corpn., is reported to have aided in drafting the plan. He accompanied the steel executives to Washington.

The plan was explained first to the Rank and File Committee of five led by President Tighe of the Amalgamated Association by both General Johnson and Secretary of Labor Frances Perkins. When later explained by Edward F. McGrady, Assistant secretary of Labor, it was assailed by the militant members of the group on the ground that it did not say when the board would act and gave no assurance of collective bargaining and apparently dealt only with company union elections. Last Saturday General Johnson again explained the plan to a still larger group, also led by Mr. Tighe, and some of the more radical members came out of the conference saying they would reject the plan, Mr. Tighe said it would be put before the convention to be voted upon. The President, to whom the plan was read over the telephone by General Johnson, could, however, organize the board even if the union men disapprove of the machinery provided by the plan.

Workers Belligerent

Most of the workers' delegation who called on General Johnson entered and emerged from the conference in a belligerent mood. It was partly due to the attack General Johnson made on steel workers in a radio broadcast Friday night. He explained to the workers, however, that he did not have them in mind but rather referred to another union whose members General Johnson has said are communists.

The conference between General Johnson and the steel institute committee and the report that it had "defied" the Government, was seized upon by the radical steel workers in Washington. They went from Government office to Government office, "conferring" with various officials and giving out fiery blasts for the press. They were pressing for a conference with the President, they demanded a "show down" and would not be mollified. At a meeting Thursday with Miss Perkins the Rank and File Committee erupted through one of its spokesmen, Mel Moore, Steubenville, Ohio, with the declaration that the workers were "through" with Miss Perkins. "We've had nine months of stalling and we're not going to stand for any more." They announced they were going to take their case to the President. It clearly was one of many moves of the militants to gather publicity and to climax their efforts by unloading their complaints into the lap of the President.

Almost at the same moment the Rank and File Committee had its disagreement with Miss Perkins, the nature of which was not made known, a

quieter meeting was taking place. It was a conference between a delegation of company union workers from McKeesport, Pa., and General Johnson. The delegation protested strongly against a strike. Headed by Watson McKee, chairman of the National Compliance Board and secretary of the chamber of commerce of McKeesport, it included 13 steel workers, three from the plant of the McKeesport Tin Plate Co., six from the plant of the American Sheet & Tin Plate Co., and four from the plant of the National Tube Co.

Mr. McKee said General Johnson wanted to know if the workers represented "company dominated" or legitimate company unions and was told they represented the latter. One worker carried a ballot box containing votes cast by workers at the plant of the National Tube Co. to determine whether or not they favored a strike. Of the some 5000 workers at the plant, 3979 voted against a strike and 331 voted for a strike. In reply to a question by General Johnson he was told the vote was taken by secret ballot and otherwise cast without any "interference" or "pressure" from the management. The general also inquired how many workers would remain on their jobs if there were a walkout. He was informed, according to Mr. McKee, that it would depend on the attitude of the strikers and that those who wanted to work would not attempt to "buck" a picket line of strikers because they wanted peace, not violence, and above all did not want a strike to take place. After talking with General Johnson, the delegation held a conference with Senator Wagner.

Governor Pinchot Contradicted

The delegation also challenged the statements repeatedly made by Governor Pinchot of Pennsylvania that steel concerns were arming.

"I'll eat any machine guns and barbed wire Governor Pinchot can find in our mills," said Mr. McKee. "As far as the McKeesport mills are concerned, the Governor's statement is incorrect."

Other steel workers have protested to Washington against a strike. Workers for the Superior Steel Co. last week through an attorney for the company told the NRA that they are not in sympathy with the strike movement.

The group from McKeesport expressed the view that the Rank and File Committee was seeking to gain control of the international offices of the Amalgamated association.

Weirton Company Again Challenged

Among its many other activities, the Rank and File Committee, sent President Roosevelt a telegram last Thursday in which they charged the Weirton Steel Co. had discharged 116 men, including two union leaders, claiming this action followed a canvass by company "bosses" to discover the names of men who proposed to go on strike. It was the old tactics of turning to the most routine operation of a company to build up charges. The Department of Justice also made the rather routine announcement that it is investigating. Officials of the department said conferences had been held with Weirton Steel Co. employees in order to learn if there should be an appeal from the decision of the Federal District Court at Wilmington, Del., which denied the Government petition for an injunction against the company. The Government had charged the company interfered with collective bargaining and was defeated in its move. James Lawrence Fly, special assistant to the attorney general, said he had conferred with Long, George Moore and Mel Moore, employees of the Weirton company. The fact that the department sought the advice of workers as to whether to continue the suit was taken to indicate the Government has misgivings as to the soundness of its case.

Not to be left out of the picture, President Green of the American Federation of Labor broke out with a statement charging that Congress is failing labor, urging enactment of the Wagner labor disputes bill and the Connery 30-hr. bill, together with other legislation, and declaring that "The threatened strike in the steel industry and the defiant statement of the steel barons denying the steel workers the right of collective bargaining, create an emergency, and for that reason Congress ought to meet it promptly by enacting the Wagner disputes bill into law."

New NRA Price Policy Does Not Affect Existing Codes—Other Code News

WASHINGTON, June 12.—Both coded and uncoded industries throughout the country were stirred by the NRA price policy announcement on June 7. Many thought it meant the banning of all price protection clauses in codes already approved and codes to be approved. Praise came to the NRA from members of Congress who have consistently opposed price determination policies. Even the National Recovery Review Board hastened to pat itself on the back for forcing the NRA to ban price fixing. On the other hand protests deluged NRA for removing price protection. Still another view came from various industries. This was that, even if the announcement was intended to bar price fixing, it was hedged with so many provisions that they were sufficient to prevent price policy.

Two statements were required before NRA was satisfied that it had made itself clear. Actually, there still is a belief that NRA is definitely moving toward the banning of price fixing in any form, heated denials from high NRA officials to the contrary notwithstanding. For price clauses have come in for increasing criticism. Perhaps the original objection came from within NRA itself—the Consumers' Advisory Board. But it has spread broadly to many sources, the Darrow board merely being a slow follower and not an important element in the matter at all.

The question arises as to what industries would care for codes if price protection were removed. Removal is not an immediate prospect, however, as indicated by statements by General Johnson, but despite his views there is a strong belief price clauses are doomed to go. It is significant that price protection was entirely removed from the steel code as recently revised. This marked the first code which had price protection provisions removed. Being a major code the action was looked upon as a probable entering wedge to widespread removal of price provisions. Significant or not, the announcement on the new price policy came from NRA four days before the revised steel code went into effect.

Codes in Effect Not Altered

After the first batch of protests came to NRA regarding its new price policy, it issued an explanation that the new price policy announcement does not in any way alter particular price provisions of already approved codes. The point was made that while pending codes and codes hereafter submitted for approval will be adjusted to the new policy, codes already approved will be amended to conform only as the result of negotiations with and agreement by the interested code authorities.

On the day following General Johnson issued another statement giving the same views as those in the prior statement, except that the General expressed the hope "that industries under approved codes may desire to agree to changes." But he assured industries no changes will be imposed "in an approved code or any change suggested without relation to the particular conditions in that code." Mentioning specifically automotive, bus, trucking and rubber tire codes along with others, General Johnson cited them as examples of codes whose pro-

visions remain in full force. Omission to mention other codes, hardware, etc., does not mean that the general statement does not apply to it. In short it is up to the code authorities whether changes will be made.

New Codes Approved

Administrator Johnson has approved five codes supplemental to the approved basic code for the machinery and allied products industry. The first two cover the water-power equipment industry and the rolling-mill machinery and equipment industry. Both become effective on June 18.

Both codes adopt the wage, hour and labor provisions of the basic code as well as most of the other pertinent clauses. Both are approved subject to a stay of the clause providing for a waiting period between the date of filing and effective date of price lists and in the case of the former code, sections 6, 7, 8 and 9 of Article VIII relating to certain of the fair trade practice regulations are stayed for a period of 15 days after the code's effective date.

The three additional divisional codes cover the mechanical lubricator industry, the contractors pump industry and the locomotive appliance industry. All three adopt the wage, hour and labor provisions of the basic code. Each provides for a supplementary code authority of from three to five members so elected that both members and non-members of the industry's trade association shall have adequate representation. They require the establishment of a uniform cost accounting system and open price lists, and empower the code authority to establish a lowest reasonable cost for the industry in the event of emergencies due to destructive price cutting and, with the approval of the Administrator, in that event no member of the industry shall sell below the costs so arrived at. The code for the first-named industry becomes effective on June 15 and the other two on June 16.

Metal Etching Code Approved

A code of fair competition for the metal etching industry, bringing the number of codes to 456, has been approved. Employees in the industry are limited to 40 hr. per week, 8 hr. per day and 6 days per week, with the proviso that unusual or peak demands may be met by working 48 hr. per week for not more than 12 weeks in any one year. Time and one-third must be paid for all over 40 hr. worked in any one week.

A code authority of five persons elected by all the members of the industry is provided for, a uniform cost accounting system is to be devised, open price lists are required and selling below reasonable cost is forbidden only when an emergency exists due to destructive price cutting. The code becomes effective June 18.

An amendment to the code of fair competition for the fabricated metal products manufacturing and metal finishing and metal coating industry under which is eliminated the necessity for organization of a supplementary code authority for many subdivisions of the industry, has been approved. It permits members of the industry to operate under the code, with the assistance of such additional fair trade practice provisions as may be found necessary, without the submission of supplementary codes.

A further provision of the amendment permits groups or subdivisions which may be now or hereafter operating under approved supplemental codes to withdraw those codes and operate in accordance with the amendment. The amendment becomes effective June 16.

Exemptions from Steel Furniture Code

Exemption of the steel office furniture division from certain provisions of the business furniture, storage equipment and filing supply industry code, in order to facilitate purchases by the procurement division of the United States, is being made.

This code establishes a uniform schedule of quantity discounts. The procurement division is accustomed to take bids on steel furniture requirements over a six-months' period without specifying any quantity of the various items. In other words, the contracts are based on a price each on various items of furniture, which must be furnished in any quantity from time to time. This contract therefore assumes the status of a "one-order-one-delivery" sale and under the terms of the code does not warrant any quantity discounts.

The steel office furniture division requested an exemption, which the Administrator has granted, but only to the extent that when applied to purchases by the procurement division maximum quantity discounts are permitted regardless of quantity involved in any one order.

Code For Alloys Industry

A proposed code for the alloys industry has been submitted by the American Alloy Producers Association and will receive a public hearing under Deputy Administrator W. A. Jannsen, June 25.

Budgets and Amendments

The industrial furnace manufacturing industry, through its code authority, has submitted a budget and basis of contribution by members of the industry for administration of its code. Notice has been given that objections to, criticisms of, and suggestions concerning the budget and basis of contribution must be filed before June 22 with Deputy Administrator Neal W. Foster, room 3060 Department of Commerce Building.

Opportunity will be afforded parties in interest to file criticisms or objections to the proposal of the code authority for the packaging machinery industry and trade for modification of the existing code. Such criticisms or objections must be delivered to Deputy Administrator Joseph Dilworth, room 4036, Department of Commerce Building prior to June 15. The proposed modification relates to the budget for the administration of the code, the method of assessment upon members and the expenditure of its funds, to assess companies, organizations, partnerships or other forms of business organizations in the industry and trade which manufacture or market packaging machinery as one of two or more lines of products.

Deputy Administrator Barton W. Murray has announced that all objections to proposed amendments to the approved code for the fan and blower industry, providing for the submission of a budget and schedule of contributions to the Administrator, for the support of the code authority, should be filed in writing in room 3068 of the Commerce Building, prior to June 16.

Code Authorities Recognized

Administrator Johnson has approved the method of selection and recognized the code authority for the following industries:

Machine Tool and Forging Machinery Industry: Henry Buker, Brown & Sharpe Mfg. Co., Providence, R. I.; James E. Gleason, Gleason Works, Rochester, N. Y.; H. M. Lucas, Lucas Machine Tool Co., Cleveland; R. M. Gaylord, Ingersoll Milling Machine Co., Rockford, Ill.; August H. Teuchter, Rockford Radial Drill Co., Cincinnati; Wendell W. Whipp, Monarch Machine Tool Co., Sydney, Ohio, and H. M. Lind, National Machine Tool Builders Association, Cleveland.

Industrial Furnace Manufacturing Industry: Chairman, A. D. Dauch, manager of sales, George J. Hagan Co., Pittsburgh; W. B. Wallis, president, Pittsburgh Lectromelt Furnace Co., Pittsburgh; H. G. Dixon, president, H. L. Dixon Co., Rosslyn Station, Carnegie, Pa.; W. H. Cosgrove, vice-president, Swindell-Dressler Corpn., Pittsburgh, and F. M. Hartford, Allied Engineering Co., Cleveland.

American Petroleum Equipment Industry and Trade: Chairman, W. L. Childs, vice-president, Reed Roller Bit Co., Houston, Tex.; vice-chairman, J. A. Crawford, president, Republic Supply Co., Los Angeles; Percy C. Jones, president, S. M. Jones Co., Toledo, Ohio; J. A. Geismar, president, National Supply Co. of Delaware, Toledo, Ohio; B. F. Harris, president, Oil Well Supply Co., Pittsburgh; H. J. Lockhart, president, Parkersburg Rig & Reel Co., Parkersburg, W. Va.; E. S. Dulin, president, Byron-Jackson Co., Los Angeles; D. S. Faulkner, vice-president, National Supply Co. of California, Torrance, Cal.; L. H. Keim, vice-president, Oil Well Supply Co., Los Angeles; F. C. Merritt, president, Elliott Core Drilling Co., Los Angeles; W. A. Trout, vice-president, Emsco Derrick & Equipment Co., Clearwater, Cal.; J. L. Shakely, vice-president, Frick-Reid Supply Corpn., Tulsa, Okla.; F. E. Bernsen, president, Lucey Products Corpn., Tulsa, Okla.; A. A. Bushow, president, Bridgeport Ma-

chine Co., Wichita, Kan.; Earl W. Miller, vice-president, American Iron & Machine Works Co., Oklahoma City, Okla.; A. A. Moody, vice-president, Jarecki Mfg. Co., St. Louis; W. J. Morris, president, Continental Supply Co., Dallas, Tex.; F. S. Carothers, manager, Norvell-Wilder Supply Co., Houston, Tex.; B. Boykin, Jr., vice-president, International Derrick & Equipment Co., Beaumont, Tex.; Stanley P. Brown, vice-president, Hughes Tool Co., Houston, Tex.; John T. Crotty, president, Republic Supply Co., Houston, Tex., and T. T. Word, president, Word Supply Co., Houston, Tex.

Administrator Johnson has approved the method of selection and recognized the personnel of the code authority for the saw and steel products manufacturing industry. They are: H. C. Atkins, president, E. C. Atkins & Co., Indianapolis, Ind.; W. C. Hecker, president, Curtis Mfg. Co., St. Louis; William D. Disston, vice-president, Henry Disston and Sons, Inc., Philadelphia; E. Foster, general manager, saw department, R. Hoe & Co., Inc., New York City; W. B. Huther, president, Huther Bros. Saw Mfg. Co., Rochester, N. Y.; E. M. Holfelner, general manager, Ohlen-Bishop Co., Columbus, Ohio, and G. K. Simonds, general manager, Simonds Saw & Steel Co., Fitchburg, Mass.

Deputy Administrator Joseph Dilworth has announced that all objections and suggestions regarding the proposed budget and schedule of contributions for the support of the code authority for the machine tool and equipment distributing trade should be filed with him in Room 4036 of the Commerce Building prior to June 27. The proposed budget totals $16,200, and members of the industry would be expected to contribute on a sliding scale based on average sales for the years 1929 to 1933 inclusive and varying from $10 on sales up to $50,000 to $250 on sales above $2,000,000.

Administrator Johnson has approved a supplementary code of fair competition for the cutting die manufacturing industry, a division of the fabricated metal products manufacturing and metal finishing and metal coating industry. The approved code becomes effective June 18, subject to an indefinite stay of provisions which require a waiting period between the time of filing revised price lists and their effective date; and subject to an order of the administrator which eliminates the prohibition against quantity discounts and prescribes that any filed price list "shall state the prices of each grade, kind and quantity of each product sold or offered for sale."

Beebe Bros., Seattle, Wash, manufacturers of a steel hand hoist, have been ordered to operate under all the provisions of the approved basic code for the fabricated metal products manufacturing and metal finishing and metal coating industry and were exempted from the hour and wage provisions of the woodworking machinery subdivision of the machinery and allied products code.

Administrator Johnson has appointed administration members to four code authorities.

Abrasive grain industry: F. E. Barth, vice-president and assistant general manager, Graton Knight Co., Worcester, Mass.

Bright wire goods manufacturing industry: R. P. Barry, formerly private secretary to Stuyvesant Fish, president of the Illinois Central railroad.

Stone finishing machinery and equipment industry: David Newhall, formerly sales agent of steel cars and auxiliary locomotives for the Bethlehem Steel Co. Prior to 1915 Mr. Newhall was president of the George M. Newhall Engineering Co., selling locomotives and wrecking cranes. From 1915 until the end of the war he was vice-president in charge of sales for the Victor Box Mfg. Co., manufacturing ammunition boxes. Since leaving the Bethlehem Steel Co., he has been associated with the Motor Stokor Corpn. as Philadelphia sales agent, and has been in business for himself handling second-hand railroad equipment.

Porcelain enameling manufacturing industry: E. G. Vail, formerly president of the Gurney Refrigerator Co., Fond Du Lac, Wis., to succeed Sam T. Johnson, deceased. Mr. Vail was connected with Fairbanks Morse & Co. of Chicago.

Urge Five Billion Building Program

WASHINGTON, June 12.—Appropriation by the present Congress of at least $5,000,000,000 a year for the next two years for a construction program is asked in a petition addressed to President Roosevelt by a long list of trade organizations and individuals, including ministers, lawyers, professors, social workers and others. Heading the list is the name of Dr. John Dewey, chairman, the Joint Committee on Unemployment, New York.

Unemployment of 10,000,000 and more men and women is declared to exist, violence raging or impending in a dozen states, and it is declared a successful construction program will reduce the amount needed for direct relief. Private employment, it is stated, will not reemploy enough men to affect appreciably unemployment in the durable goods industries in time to avert serious trouble.

The President is asked to recommend to Congress the immediate creation of adequate credit for construction and public works, including housing, to assess part at least of the cost of public improvements upon profit benefited thereby "and also power to prevent extortionate prices of lumber, steel, cement and other material essential to the construction program."

Escanaba Gets Loan For Ore Docks

WASHINGTON, June 12.—The Interstate Commerce Commission has approved the application of the Escanaba, Iron Mountain & Western Railroad for a PWA loan for the construction of reinforced concrete or steel ore docks with approach and tracks. The proposed dock will have a capacity of 130,000 tons if certain additional traffic is assured within the next few weeks and will cost $3,500,000. Should it appear later that the volume of traffic cannot be obtained, the proposed dock will be constructed to have a capacity of 92,500 tons and will cost $2,600,000. The dock will adjoin two ore docks of the Chicago & Northwestern Railroad at North Escanaba, Mich., and will be leased by the latter carrier for a term expiring Jan. 1, 1950. The commission report said one of the two wooden docks of the Northwestern because of its age cannot be economically operated after the present year.

Microscope for Studying Steel at High Temperature

SEVERAL years ago an apparatus was developed at Harvard University by Dr. B. A. Rogers, now a research associate at the United States Bureau of Standards, Washington, which permitted the direct observation of the microstructure of iron at high temperatures, even up to the melting point of the metal. This apparatus is now being applied to the study of the austenitic grain size in carbon tool steel in a current research project at the bureau.

While it is possible to maintain a bright, clean surface on a specimen of pure iron in this high-temperature metallographic microscope by passing hydrogen through the inclosed specimen chamber, it is not permissible to use hydrogen when the specimen under examination is carbon tool steel because of the rapid loss of carbon caused by the hydrogen. The examination of the carbon steels is being carried out in an atmosphere of mixed carbon monoxide and carbon dioxide and in an atmosphere of helium.

H. A. Brassert & Co., Chicago, have received an order from Bethlehem Steel Co. for a new high-efficiency hot blast stove to be erected at "F" blast furnace, Lackawanna, N. Y.

Tighe Fighting to Retain Union Leadership

PITTSBURGH, June 12.—Casting aside his usual cloak of conservatism, Michael F. Tighe, veteran president of the Amalgamated Association of Iron, Steel and Tin Workers, yesterday declared that he is now strongly in favor of the strike resolution drawn up at the meeting of the association delegates last April. That statement was made shortly after the deadline set by the association for acceptance of its demand for recognition by the steel industry. Prior to the deadline, Tighe had maintained his customary reticence. Just what significance can be attached to his surprisingly open declaration is a matter of conjecture. But the apparent split in the association's ranks has resulted in a virtual war to establish leadership.

Tighe's conservative behavior during all the recent bickering of other Amalgamated cohorts in their attempts to prove a real case to the Washington administration had apparently not won for him any strong support from the younger element in the union, which has been represented unofficially at Washington by members of the so-called rank and file committee, headed by Earle J. Forbeck. Tighe's unequivocal statement is therefore considered possibly as a prelude to the position he will take at the forthcoming meeting of Amalgamated delegates at Pittsburgh on June 14, when plans for carrying out the union's orders for a holiday will be laid. All delegates who attended the April meeting have been recalled for this conference.

There seem to be little doubt at this writing that the Amalgamated will not retreat from its threat to call a holiday, particularly in view of its expressed scorn for the Government proposal, which has already been accepted by the steel industry through the American Iron and Steel Institute. One ray of hope for a compromise is the possibility of a counter proposal of the union for submission to the Government and the steel industry. But it is a foregone conclusion that such a proposal would reflect unorthodox ideas of the more unruly factions in the Amalgamated Association. Already the so-called rank and file committee has unofficially expressed its ideas on that score. That pseudo-committee of the union suggests that the strike might be averted in three ways, namely, election of employees' representatives under governmental supervision; passage of the Wagner bill, and conferences under the sole personal supervision of President Roosevelt between the union's leaders and the American Iron and Steel Institute representing the steel managements, for drawing up labor legislation which must be enacted by Congress. Regardless of what course of action is finally decided at the Amalgamated conference on Thursday, it is considered that the association will meet with ultimate failure in its present demands merely by calling a strike. The preponderance of sentiment among steel workers against a strike practically spells defeat before the battle is waged. Steel companies are not openly alarmed over the strike threat and, if the truth were known, the keenest interest in the whole affair is centered in the battle for leadership of the Amalgamated Association.

President Intervenes to Prevent Steel Strike—Negotiations Secret

WASHINGTON, June 12.—Last minute moves to prevent the threatened steel strike are being made by President Roosevelt. Their nature is being carefully guarded pending final determination of the next step. It was stated this morning by General Hugh S. Johnson that a further White House conference probably will be held today but he refused to indicate points that are being discussed. The matter was discussed with the President yesterday at a two-hour conference attended by General Johnson, Donald Richberg, NRA General Counsel, Senator Wagner and a representative from the Department of Labor.

The statement by Senator Wagner, chairman of the National Labor Board, that some governmental action was being considered was not amplified. It gave rise, however, to a report that the President had some definite plan in mind in an effort to avert the threatened strike. One report was that he would ask Congress to enact legislation providing for the setting up of industrial relations boards in all industries not now having such boards. This legislation, it is said, would be in the nature of a compromise for the pending Wagner Labor Disputes Bill. It is generally conceded that the latter could not be enacted at the present session, now drawing to a close. Adjournment may take place on Saturday of the present week.

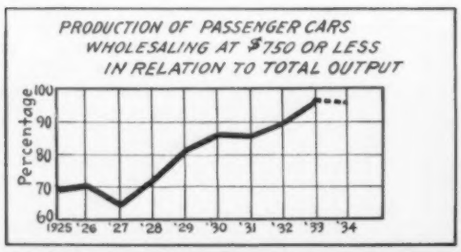
President Roosevelt has in mind suggestions for a change in the plan for the three-man mediation board to which the American Iron and Steel Institute has agreed but which has been bitterly attacked by the left wing of the rank and file committee of the Amalgamated Association of Iron, Steel and Tin Workers. This organization, however, is presenting demands, such as union recognition, the 30 hr. week, direct Presidential mediation, and meeting between workers and steel manufacturers, that it is realized will not be accepted. General Johnson again today declared that the proposed board for the steel industry is "highly workable and admirable." This was taken to indicate that he is of the opinion that it should be let stand as it is or if revised that the principle provided should be maintained.

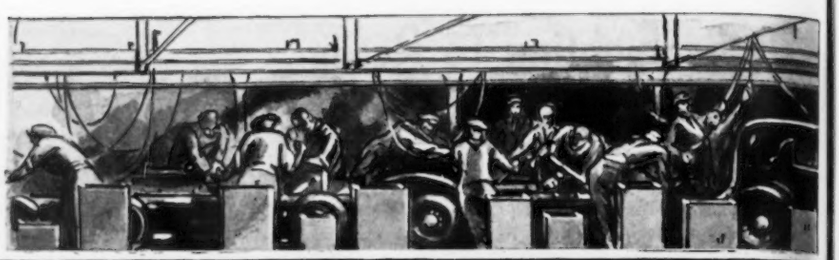
The administrator doubts that he or anyone else from NRA will go to Pittsburgh to attend the convention of the Amalgamated Association Thursday. He said that Mr. Richberg might attend the regular meeting of the code authority of the steel industry on that day, though this has not been definitely decided upon.

Any plan for settlement of the steel strike, if a new or revised one is made, General Johnson said, will have to be announced by the White House. The plan as accepted by the steel industry, General Johnson said, was read by him over the telephone to the President but it was added that the latter did not indicate either his approval or disapproval of the plan.

Setting up conciliation boards immediately in the hope of averting the threatened steel strike as the first objective is said to have been discussed at a White House conference this afternoon. It was reported that this would be done by Congress before adjournment. It would mean substitution of this plan for the Wagner Labor Disputes Bill. That such a proposal was discussed was indicated by Senator Walsh.

Upon leaving the President's office, Senator Walsh was asked if the Wagner bill will be modified. "Maybe," he replied. Senate Majority Leader Robinson, Arkansas, said labor legislation was discussed with the President and that no final conclusion was reached. "We expect to make a final announcement tomorrow," Senator Robinson said, "on a course to be taken regarding the legislation." It was not indicated, however, that the legislation, even if enacted at once, would be acceptable to the steelworkers who are threatening to strike and have rejected the three-man labor board proposed for the steel industry and accepted by the American Iron and Steel Institute. Nor has there been any intimation of the attitude of the industry itself toward the conciliation boards.





THIS WEEK ON THE

Car Assemblies in First Half Will Be About 1,750,000 Units

DETROIT, June 12.

AS the end of the first half of the year approaches, the automobile industry can look back upon a six-months' period of which it may well be proud. The National Automobile Chamber of Commerce estimates May production at 336,657 units, compared with 378,983 in April. With assemblies in June likely to be at least 250,000 units, and possibly nearer the 300,000 mark, the industry's total output for the January-June period should be between 1,730,000 and 1,775,000 units. This compares with 1,045,372 units in the similar period of 1933, with 2,025,869 in all of last year, and with 1,431,494 in all of 1932.

Perhaps overshadowing all other achievements of the industry in the last six months has been the sensational comeback of the Ford Motor Co. At this time a year ago, it was a very poor second in registrations of passenger cars. Today a nip-and-tuck struggle for first place is in progress between Ford and Chevrolet. The morale of the Ford organization was never higher than it is now, its merchandising never so effective.

Yet the luster of the Ford performance should not be allowed to dim the record of others. Chrysler Corpn. can show enviable figures for the first five months of 1934. During that period its output was more than twice that in the corresponding months of last year —324,154 passenger and commercial cars, as against 151,518. Every division of the corporation, including the Airflow lines, exceeded last year's volume. The corporation's distributers and dealers did over one-third of all the passenger car business of member companies of the N.A.C.C., compared with one-fourth of the total business during last year.

General Motors has made the smallest gain of the Big Three, although its percentage of increase should satisfy any company in these days. From January to May inclusive, its total sales to dealers amounted to 603,395 units, compared with 384,921 units in the corresponding months a year ago.

Some of the small independent car manufacturers have tasted the rich repast set before the industry. Hudson, for example, has turned out more Hudsons and Terraplanes than in all of 1933. Reo has been maintaining a much stiffer pace than last year.

All of this makes exceedingly pleasant reading, but unfortunately the industry, rowing strenuously upstream out of a depression, can't afford to rest long on its oars or it may be carried back down quite a distance. It is this realization which is worrying the managements.

Industry Shifting Its Strategy

What of the last half of the year? A close study of the situation leads to the conclusion that the industry lately has shifted its strategy. A few weeks ago it seemed bent on moving ahead as rapidly as possible with its tooling programs so as to bring out 1935 models in the early fall, thus helping stabilize employment and providing dealers with new merchandise at a time of the year when sales normally lag.

Without warning, the industry has apparently substituted watchful waiting for quick action. Equipment buying, so imminent a month ago, is practically at a standstill. Inquiries, on which bids have been submitted, are conservatively estimated to involve $1,000,000 worth of machine tools, and programs under consideration total an equal amount. Yet these proposals are left dangling, with the possibilities rapidly fading of translating many of them into orders in the next 30 days.

Tool and Die Orders Withheld

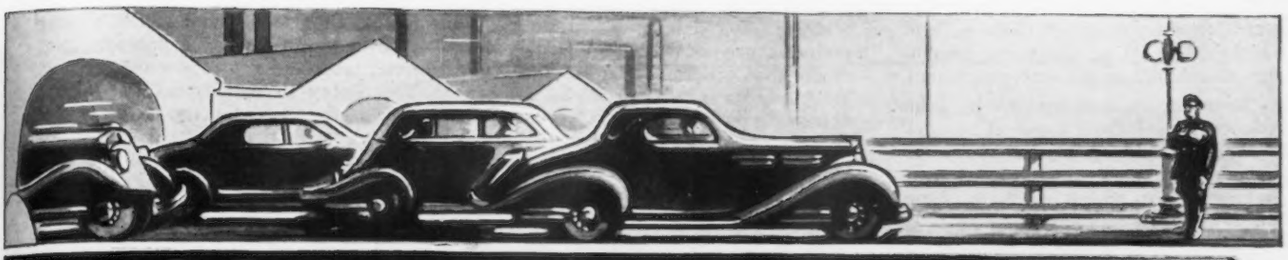
Orders for tools and dies for new models have not been forthcoming, although recently it was the avowed purpose of car makers to get started early and avoid the jam in which they were caught last year. About the shortest time on record between the beginning of a tooling program involving the purchase of new machinery and production of the first car is believed to be 90 days; the average time is four months or longer. This means that any program which might be undertaken by July 1 probably wouldn't be completed before Oct. 1.

Thus a general influx of 1935 models is not expected until October or November, and possibly not until December. Whatever the time will be, plans are being zealously guarded by manufacturers so as to keep labor unions in a fog, and to keep competitors guessing. The probability is that, in most cases, car makers themselves have made no decision, because they are awaiting the outcome of the Wagner Bill and of the threatened steel strike before proceeding further.

In fact, the automobile industry is inclined to sit on the sidelines and watch the Washington spectacle, reserving a definite decision on major policies for 1935 until Congress has adjourned.

Shows Cause Hot Controversy

Another element of uncertainty injected into the situation is the controversy over the abolition of the New York and Chicago national shows and the substitution for them of local



ASSEMBLY LINE

By BURNHAM FINNEY
Detroit Editor, THE IRON AGE

shows held simultaneously late in February during an Automobile Week. One of the hottest fights in the history of the N.A.C.C. is said to be centering about this proposal, with the chances favoring a compromise proposal of some sort, possibly the continuation of the New York and Chicago shows under dealers' auspices.

A decision to proceed slowly on change-overs, as well as a desire to stem the tide of Ford sales, probably had some bearing on the holding of 61 shows by General Motors last week and the slash in retail car prices by Chevrolet, Pontiac, Oldsmobile, Plymouth, Dodge and Graham. Intensive sales drives are now on to sustain sales at as high levels as possible during the next 60 days. The chief aim seems to be to use as many artificial restoratives as possible to stretch out the life of current models.

It is difficult, under the circumstances, to view with much optimism the outlook for steel demand during at least the first half of the third quarter. Steel in the hands of automotive users on July 1 will be equivalent to a 30 to 60 days' supply. In the case of flat-rolled items, particularly certain grades of sheets, a few companies are laying in enough tonnage to meet requirements during the entire third quarter. This is understood to be true of Chrysler Corpn. However, it is limiting speculative buying largely to flat-rolled steel which has advanced most in price.

Pick-Up In Steel Buying Expected Aug. 15

After the final rush of tonnage this week at old prices, the steel trade is anticipating a very lean period until about Aug. 15 or possibly Sept. 1, when purchases will be made for the first production runs on 1935 cars. Chevrolet gave some steel releases the past week, which consisted of the balancing of certain items. It is expected this week to buy steel for about 50,000 cars for July production. Chevrolet is reported to have decided not to make steel contracts for next quarter, being content to place its requirements from month to month.

It would be unusual if motor car companies cut prices and then refrained from using such action as a lever to secure concessions in turn from suppliers. Already one prominent company, in seeking bids on parts contracts for the last half of the year, is understood in some cases to have asked for a reduction of 10 per cent and for a revision of current contracts, as of June 1, on to the lower price basis. The excuse for such a request is that the company has been compelled to lower prices, consequently it must reduce production costs.

Parts Makers State Their Case

Some parts makers declare that they are realizing considerably less than 10 per cent on current contracts and to grant the concessions demanded would mean going into the red. They point out that costs of materials and labor have gone up steadily and that the trend of their prices should be up rather than down. Moreover, they state that retail prices of automobiles, even after the recent advances have been erased, still remain at approximately the schedules set at the beginning of the year, and these schedules were substantially above 1933 prices. In the case of Chevrolet, for example, they were up about $30.

It will be recalled that when the last price advance was announced about April 1, one car manufacturer, which boosted prices $25 to $45 a car, picked out steel to take the blame, although it just then was feeling the first effects of having to pay more than the 1933 schedules for steel. That is, most of the cars it made in the first quarter contained steel bought last year prior to major price advances.

Unless previous experiences prove misleading, it is believed that the company which has asked for downward revisions of parts prices will exert enough pressure, now that volume is receding, to secure what it wants. It probably will follow the usual procedure of changing a few sources of supply and thereby frightening the remainder of its vendors into compliance. The belief is well-founded that other automobile companies shortly will follow the lead of the one company already mentioned in attempting to obtain lower prices for parts.

Model 44 Job Dismissed

Evidently the success with which its current V-eight car is meeting has led the Ford Motor Co. to dismiss for the present any thought of introducing its small model 44. It is understood that recently machinery originally designed and built for the proposed small car and which has been standing idle for more than a year has been rebuilt for work on the present car. This would seem to dispose of the reports constantly recurring that Ford is about to plunge into the 44 job.

Hupmobile is said to be developing a small car which will have a six-cylinder engine manufactured outside its plant. It is not unlikely that the engine may be built by the Wilson Foundry & Machine Co. at Pontiac.

Packard is in the process of rearranging its entire plant so that greatly increased output can be secured from the same space heretofore used, thus accommodating manufacture of its smaller car. As mentioned in this column recently, a separate organization is being established at Packard to make the light car. It is believed

IN view of price cuts made by several automobile manufacturers recently, the following table of comparative prices is of interest. In each case the price given is for the business coupe f.o.b. factory:

Chevrolet Standard	$485
Plymouth Standard	485
Ford Standard	515
Plymouth Six	540
Ford De Luxe	555
Chevrolet Master	560
Terraplane Challenger Six	565
Plymouth De Luxe	595
Oldsmobile Six	650
Dodge Standard Six	650
Pontiac Eight	675
Dodge De Luxe	690
Terraplane De Luxe—Four Passenger Coupe	690
Oldsmobile Eight	885

that few new machine tools will be purchased, most of the work consisting of rebuilding present equipment.

Chevrolet, benefiting from price reductions and from General Motors' shows, is fairly optimistic about immediate prospects. It is counting on making about 85,000 units in June, and tentatively has scheduled close to 70,000 for July and 55,000 for August. Ford still has 85,000 units projected for this month. Chrysler Corpn. should assemble 50,000 to 60,000 units.

Detroit Notes

A shake-up occurred last week in the ranks of the purchasing department of the Hudson Motor Car Co., although higher officials were not affected. . . It is said that Chrysler intends to use the old LaSalle plant, which it recently acquired, as an assembly plant. This factory is located in the southwestern section of Detroit. . . . Great Lakes Steel Corpn. and Ford Motor Co. continue to operate their open-hearth furnaces at full capacity. . . . Automotive production foundries in southern Michigan have been compelled to reduce sharply their melt as specifications taper. Inquiries before jobbing foundries specializing in manufacture of automotive dies indicate that orders should be placed almost any day. . . Continental Motors is moving part of its sales, service and engineering offices to the Muskegon plant. Executive offices and the airplane engine, stamping and machine products departments remain in Detroit. Part of the local Continental plant now is occupied by Chrysler Corpn. . . May was the biggest month in Plymouth's history, the factory turning out 46,246 cars.

Pontiac has begun placing orders for equipment for its six-cylinder car to be introduced in the Fall. Since it is reported that the estimated production volume on this car as well as on the eight for next year has been sharply cut, Pontiac is enabled to make use of considerable machinery now in its plant. This equipment will be rebuilt with most of the work probably being done by two machine tool companies. Because of this fact expenditures for new machine tools will be light.

It has long been customary for Chevrolet to reveal new models in December but it will not be surprising if this plan is abandoned the coming year-end in favor of a postponement until late January or even February. This delay in making a change-over would give Chevrolet the advantage of looking over new features to be incorporated in 1935 Plymouths and Fords, both of which are expected before Jan. 1. The recent price reduction and the stimulus of the General Motors shows have so increased Chevrolet sales that the June production schedule has been stepped up to 100,000 units. Plymouth, which is said to have decided against September introduction of new models, is now launching the biggest summer promotional drive in its history to keep factory operations near capacity if possible during June and July.

Production of Airflow De Soto cars in May totaled 3141 cars, raising the total for the first five months of this year to 9276 cars. Assemblies of Airflow Chryslers and of Chrysler sixes last month amounted to 8079 units. Up to June 1 General Motors of Canada had made 5000 more cars this year than in the entire year of 1933. It expects to turn out 7000 cars in June.

Steel Ingot Output Registers 15.7 Per Cent Gain—Highest Since 1930

MAY production of Bessemer and open-hearth steel ingots, as reported by the American Iron and Steel Institute, amounted to 3,396,783 gross tons, an increase of 15.7 per cent over the 2,935,631 tons produced in April. May output last year was only 2,001,991 tons. Steel was made last month at the rate of 125,807 tons daily or at 58.06 per cent of the industry's theoretical capacity. The April daily rate was 117,425 tons or 54.19 per cent of capacity, while in May, 1933, the production rate averaged only 34.11 per cent.

Total steel production in May was the highest since June, 1930, although the daily rate was exceeded in July of last year, when the industry operated at 58.95 per cent.

PRODUCTION OF OPEN-HEARTH AND BESSEMER STEEL INGOTS
(Gross Tons)

Reported for 1933 by Companies Which Made 96.57 Per Cent of 1932 Ingot Output

1933	Open-Hearth	Bessemer	Calculated Output All Companies: Monthly	Calculated Output All Companies: Daily	No. of Working Days	Per Cent Operation
January	885,743	109,000	1,030,075	39,618	26	18.23
February	922,806	126,781	1,086,867	45,286	24	20.83
March	784,168	94,509	909,886	33,699	27	15.50
April	1,180,893	135,217	1,362,856	54,514	25	25.08
May	1,716,482	216,841	2,001,991	74,148	27	34.11
June	2,211,657	296,765	2,597,517	99,904	26	45.96
July	2,738,083	355,836	3,203,810	128,152	25	58.95
August	2,430,750	370,370	2,900,611	107,430	27	49.42
September	1,991,225	242,016	2,312,562	88,944	26	40.92
October	1,847,756	191,673	2,111,866	81,226	26	37.37
November	1,331,091	156,939	1,540,882	59,265	26	27.26
December	1,624,447	132,787	1,819,648	72,786	25	33.48
Twelve months	19,665,101	2,428,734	22,878,571	73,801	310	33.95

Reported for 1934 by Companies Which Made 98.10 Per Cent of 1933 Ingot Output

1934						
January	1,786,467	172,489	1,996,897	73,959	27	34.13
February	*1,993,638	175,873	*2,211,530	*92,147	24	*42.53
March	2,540,143	203,904	2,797,194	103,600	27	47.81
April	2,622,372	257,482	2,935,631	117,425	25	54.19
May	3,000,624	331,620	3,396,783	125,807	27	58.06
Five months	11,943,244	1,141,368	13,338,035	102,600	130	47.35

The figures of "per cent of operation" are based on the annual capacity as of Dec. 31, 1932, of 67,386,130 gross tons for Bessemer and open-hearth steel ingots.
*Revised.

TRADE NOTES

Pidgeon-Thomas Iron Co., Iowa at South Main Street, Memphis, Tenn., has been named a distributer of Enduro stainless steel, made by the Republic Steel Corpn., Youngstown.

The Case Hardening Service Co., Cleveland, has been named representative in the Cleveland territory for the Cooley Electric Furnace Co., Indianapolis.

Frank G. Wikstrom, Brooklyn, manufacturer of special wire stitching and paper converting machinery, also plastic molds, has recently removed from 351 Thirty-ninth Street to 30 Main Street.

Link-Belt Co., Chicago, has recently opened a warehouse at 413 Second Avenue, Dallas, Tex., where extensive stocks of Caldwell and Link-Belt conveying and power transmitting machinery will be carried. The company's sales office will also be located at the warehouse. E. G. Wendell is resident manager.

Diesel Electric Locomotives.—Westinghouse Electric & Mfg. Co., East Pittsburgh. Eighty-page booklet deals with Westinghouse Diesel engine and 15 standard sizes of Diesel electric locomotives. Specifications, outline drawings, performance curves, comparative operating data and exhibit of Westinghouse locomotives in service are included.

Accelerating Mill Pace Raises Ingot Output to 61 Per Cent

Labor Situation and Approach of Shipment Deadline Stimulate Specifications—Decline in Scrap Prices Is Halted

ASPEEDING up of mill operations to meet the delivery deadline on second quarter contracts and to forestall possible strike interruptions has raised raw steel output from 60 to 61 per cent of capacity, a rate reached only once before this year.

Although the preponderant view in the trade is that the strike threat has been a minor factor in stimulating mill activity, gains in output have been mainly in sections where organized labor has been most vocal. At Pittsburgh, where the Amalgamated association will convene on Thursday of the current week, the ingot rate has risen three points to 52 per cent, a high for the year. In the nearby Valley district, operations have advanced one point to 66 per cent, also a high for 1934. Other changes are confined to an increase of one point to 46 per cent in the Philadelphia area and a loss of one point to 58 per cent at Buffalo.

The labor situation, however, has had no effect on scrap prices. THE IRON AGE scrap composite is unchanged at last week's low of $10.67 a ton and old materials markets generally show greater stability. It is possible that scrap, at present levels, has discounted both strike contingencies and the expected lull in mill activity in the third quarter. A settlement of labor difficulties, therefore, might be followed by an upturn in this sensitive commodity.

PROTECTIVE orders for finished steel have been heaviest in tin plate and sheets, products most likely to be affected by a walkout of the Amalgamated union. Tin plate demand has been heavy since the first of the year, not even receding in the face of drought conditions, and production is holding at 75 per cent of capacity. The forehandedness of large consumers, especially the can companies, is reflected in the size of their present stocks, which in some instances are equal to three months' requirements.

In the case of sheets and strips the price advances due to go into effect on July 1 probably have influenced specifications to a greater extent than the labor situation. Buyers generally are taking virtually all the sheets and strip steel covered by their second quarter contracts. In some cases this steel will represent a liberal stock accumulation, while in others it will merely take care of early requirements. In the automobile industry only one large producer is building up inventories, having ordered a sufficient tonnage of cold-finished and cold-rolled sheets and cold-rolled strip to take care of its needs through the entire third quarter.

IN the heavier products, particularly in the case of contracts not limited to the calendar quarter, production is tending downward rather than upward, since producers wish to spread their backlogs through the summer months. In line with this policy rail mill operations have been reduced at Chicago.

Structural, plate and sheet piling awards promise to lend their weight to railroad requirements in keeping the industry going after the present period of unusual stimulation has passed. Structural steel awards, at 16,200 tons, compare with 29,825 tons last week and 11,800 tons a fortnight ago. Plate lettings total 3200 tons, while 2500 tons of sheet piling was placed. Pending piling business includes 15,000 tons for the Grand Coulee dam in Washington and 1000 tons for a Lake Erie breakwater.

THE amended steel code, which went into effect June 11, is already subject to conflicting interpretations. Although the new provisions are generally construed as barring price advances after they have been once filed for a calendar quarter, this viewpoint will undergo a severe test if a steel strike should occur. In the pre-code period, a shortage of steel, whether created by artificial conditions or not, ordinarily resulted in premium prices.

Pig iron shipments continue to mount, and in the Chicago district are expected to be twice as large as in May. In pig iron, as in steel, third quarter business is negligible since incentives for forward covering are lacking.

New prices just announced on lapweld steel boiler tubes are on a per 100-ft. basis instead of a discount basis. The designation for the product has been changed to "pressure" tubes, covering tubes for marine or stationary boilers, superheaters, cracking stills, locomotives, condensers, heat exchangers or evaporators, and tubing for refrigeration and air-conditioning equipment. There is no separate schedule for locomotive tubes.

THE IRON AGE pig iron composite is unchanged at $17.90 a gross ton. The finished steel composite, adjusted in line with code recognition of pipe preferentials, is 2.199c. a lb.

▲▲▲ A Comparison of Prices ▲▲▲

Market Prices at Date, and One Week, One Month, and One Year Previous
Advances Over Past Week in Heavy Type, Declines in Italics

Pig Iron

	June 12, 1934	June 5, 1934	May 15, 1934	June 13, 1933
Per Gross Ton:				
No. 2 fdy., Philadelphia	$20.26	$20.26	$20.26	$16.34
No. 2, Valley furnace	18.50	18.50	18.50	15.50
No. 2 Southern, Cin'ti	19.13	19.13	19.13	16.51
No. 2, Birmingham†	14.50	14.50	14.50	12.00
No. 2 foundry, Chicago*	18.50	18.50	18.50	16.00
Basic, del'd eastern Pa.	19.76	19.76	19.76	16.09
Basic, Valley furnace	18.00	18.00	18.00	15.00
Valley Bessemer, del'd P'gh.	20.76	20.76	20.76	17.89
Malleable, Chicago*	18.50	18.50	18.50	16.00
Malleable, Valley	18.50	18.50	18.50	15.50
L. S. charcoal, Chicago	24.04	24.04	24.04	23.17
Ferromanganese, seab'd carlots	85.00	85.00	85.00	68.00

†This quotation is for delivery in South; in the North prices are 38c. a ton under delivered quotations from nearest Northern furnace.

*The switching charge for delivery to foundries in the Chicago district is 60c. per ton.

Rails, Billets, etc.

Per Gross Ton:				
Rails, heavy, at mill	$36.37½	$36.37½	$36.37½	$40.00
Light rails, Pittsburgh	35.00	35.00	35.00	30.00
Rerolling billets, Pittsburgh	29.00	29.00	29.00	26.00
Sheet bars, Pittsburgh	30.00	30.00	30.00	26.00
Slabs, Pittsburgh	29.00	29.00	29.00	26.00
Forging billets, Pittsburgh	34.00	34.00	34.00	31.00
Wire rods, Pittsburgh	38.00	38.00	38.00	35.00
	Cents	Cents	Cents	Cents
Skelp, grvd. steel, P'gh, lb.	1.70	1.70	1.70	1.60

Finished Steel

Per Lb.:	Cents	Cents	Cents	Cents
Bars, Pittsburgh	1.90	1.90	1.90	1.60
Bars, Chicago	1.95	1.95	1.95	1.70
Bars, Cleveland	1.95	1.95	1.95	1.65
Bars, New York	2.23	2.23	2.23	1.95
Plates, Pittsburgh	1.85	1.85	1.85	1.50
Plates, Chicago	1.90	1.90	1.90	1.70
Plates, New York	2.13	2.13	2.13	1.598
Structural shapes, P'gh	1.85	1.85	1.85	1.60
Structural shapes, Chicago	1.90	1.90	1.90	1.70
Structural shapes, New York	2.10¼	2.10¼	2.10¼	1.86775
Cold-finished bars, P'gh	2.10	2.10	2.10	1.70
Hot-rolled strips, P'gh	2.00	2.00	2.00	1.55
Cold-rolled strips, P'gh	2.80	2.80	2.80	2.00

Finished Steel

	June 12, 1934	June 5, 1934	May 15, 1934	June 13, 1933
Per Lb.:	Cents	Cents	Cents	Cents
Hot-rolled annealed sheets, No. 24, Pittsburgh	2.65	2.65	2.65	2.10
Hot-rolled annealed sheets, No. 24, Gary	2.75	2.75	2.75	2.20
Sheets, galv., No. 24, P'gh	3.25	3.25	3.25	2.70
Sheets, galv., No. 24, Gary	3.35	3.35	3.35	2.80
Hot-rolled sheets, No. 10, P'gh	2.00	2.00	2.00	1.50
Hot-rolled sheets, No. 10, Gary	2.10	2.10	2.10	1.60
Wire nails, Pittsburgh	2.60	2.60	2.60	1.85
Wire nails, Chicago dist. mill	2.65	2.65	2.65	1.90
Plain wire, Pittsburgh	2.30	2.30	2.30	2.10
Plain wire, Chicago dist. mill	2.35	2.35	2.35	2.15
Barbed wire, galv., P'gh	3.00	3.00	3.00	2.35
Barbed wire, galv., Chicago dist. mill	3.05	3.05	3.05	2.40
Tin plate, 100 lb. box, P'gh	$5.25	$5.25	$5.25	$4.25

Scrap

Per Gross Ton:				
Heavy melting steel, P'gh	$11.75	$11.75	$12.75	$11.75
Heavy melting steel, Phila	10.50	10.50	11.25	9.25
Heavy melting steel, Ch'go	9.75	9.75	11.00	8.75
Carwheels, Chicago	9.75	9.75	11.25	9.50
Carwheels, Philadelphia	12.50	12.50	12.75	10.25
No. 1 cast, Pittsburgh	12.25	12.25	13.25	10.50
No. 1 cast, Philadelphia	12.25	12.25	12.50	10.25
No. 1 cast, Ch'go (net ton)	7.50	7.50	9.00	8.75
No. 1 RR. wrot., Phila	12.25	12.25	12.50	10.75
No. 1 RR. wrot., Ch'go (net)	7.50	7.50	8.75	6.50

Coke, Connellsville

Per Net Ton at Oven:				
Furnace coke, prompt	$3.85	$3.85	$3.85	$1.75
Foundry coke, prompt	4.60	4.60	4.60	2.50

Metals

Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Electrolytic copper, refinery‡	8.75	8.25	8.25	7.75
Lake copper, New York‡	9.12½	8.62½	8.62½	8.00
Tin (Straits), New York	51.25	51.45	53.12½	46.00
Zinc, East St. Louis	4.25	4.25	4.35	4.30
Zinc, New York	4.60	4.60	4.70	4.67
Lead, St. Louis	3.85	3.85	4.10	4.05
Lead, New York	4.00	4.00	4.25	4.20
Antimony (Asiatic), N. Y.	7.90	8.25	8.60	6.50

On export business there are frequent variations from the above prices. Also, in domestic business, there is at times a range of prices on various products, as shown in our detailed price tables. ‡Blue Eagle refinery.

▲ ▲ ▲

▲▲▲ The Iron Age Composite Prices ▲▲▲

	Finished Steel	Pig Iron	Steel Scrap
June 12, 1934	2.199c. a Lb.	$17.90 a Gross Ton	$10.67 a Gross Ton
One week ago	2.199c.	17.90	10.67
One month ago	2.199c.	17.90	11.67
One year ago	1.892c.	15.01	9.92
	Based on steel bars, beams, tank plates, wire, rails, black pipe, sheets and hot-rolled strips. These products make 85 per cent of the United States output.	Based on average of basic iron at Valley furnace and foundry irons at Chicago, Philadelphia, Buffalo, Valley and Birmingham.	Based on No. 1 heavy melting steel quotations at Pittsburgh, Philadelphia and Chicago.

	Finished Steel		Pig Iron		Steel Scrap	
	High	Low	High	Low	High	Low
1934	2.199c., April 24	2.008c., Jan. 2	$17.90, May 1	$16.90, Jan. 27	$13.00, Mar. 13	$10.67, June 5
1933	2.015c., Oct. 3	1.867c., April 18	16.90, Dec. 5	13.56, Jan. 3	12.25, Aug. 8	6.75, Jan. 3
1932	1.977c., Oct. 4	1.926c., Feb. 2	14.81, Jan. 5	13.56, Dec. 6	8.50, Jan. 12	6.42, July 5
1931	2.037c., Jan. 13	1.945c., Dec. 29	15.90, Jan. 6	14.79, Dec. 15	11.33, Jan. 6	8.50, Dec. 29
1930	2.273c., Jan. 7	2.018c., Dec. 9	18.21, Jan. 7	15.90, Dec. 16	15.00, Feb. 18	11.25, Dec. 9
1929	2.317c., April 2	2.273c., Oct. 29	18.71, May 14	18.21, Dec. 17	17.58, Jan. 29	14.08, Dec. 3
1928	2.286c., Dec. 11	2.217c., July 17	18.59, Nov. 27	17.04, July 24	16.50, Dec. 31	13.08, July 2
1927	2.402c., Jan. 4	2.212c., Nov. 1	19.71, Jan. 4	17.54, Nov. 1	15.25, Jan. 11	13.08, Nov. 22

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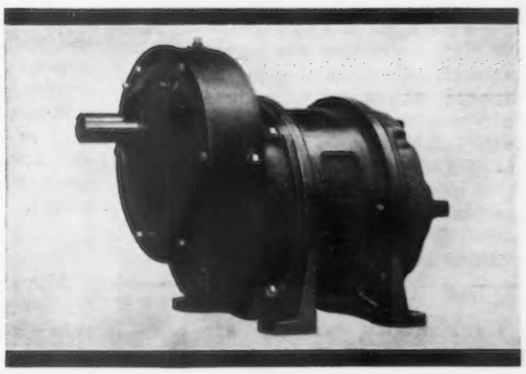


The integral design of Westinghouse gearmotors results in a minimum of moving and wearing parts—8 in single reduction units, 13 in double reduction units.

Pittsburgh Production Rises Three Points to 52 Per Cent

Valley Rate Up One Point to 66 Per Cent While Wheeling District Output Holds at 74 Per Cent — Scrap Unchanged

PITTSBURGH, June 12.—With the spotlight of the threatened strike now directed on Pittsburgh, this district is fairly bristling with activity in producing and shipping steel to meet the delivery deadline for second quarter contracts, and to anticipate possible strike interruptions. Just what proportion of current specifications can be labeled protective tonnage against strike contingencies is impossible to gage. The consensus of opinion is that the largest part of the current movement of steel receives its impetus from a desire on the part of consumers to save $2 to $8 a ton, represented in low-priced second quarter contracts.

A possible exception is tin plate, which has enjoyed a heavy demand since the beginning of the year, when consumers began to anticipate labor troubles. The steady flow of tin plate specifications has not been interrupted even in the face of drought conditions, which later on are expected to affect packs of certain crops adversely.

Regardless of the motives for current specifications, Pittsburgh steel producers are pushing their mills in an effort to fulfill June commitments by June 30. Raw steel output in the Pittsburgh district has consequently been stepped up three points this week to 52 per cent of capacity. Wheeling district production is holding at 74 per cent, while in the Valleys and nearby northern Ohio mills output is up one point to 66 per cent.

Finishing mill schedules are largely unchanged. Sheet mills are holding firmly to a 70 per cent rate, while strip mills are engaged at 60 to 65 per cent, with some units sold up for the month. Tin plate operations are higher at 75 per cent. Some small pipe mills are engaged at capacity, while larger units are running at around 50 per cent. Schedules will likely reflect sharp revisions at the beginning of third quarter, as comparatively little tonnage for that period has been booked thus far. The raw materials markets are quiet and unchanged.

Pig Iron

Until present contracts are completed by the end of June, producers expect very little third quarter business. In fact, practically no tonnage for forward delivery has been reported. With prices unchanged for next quarter there is little incentive to anticipate future needs, and contracting will probably be on a restricted basis. A slight pickup in ingot mold orders is reported, but foundry melt is generally at a low point. Further buying of basic and Bessemer is very indefinite, as most large consumers are well protected for next quarter.

Semi-Finished Steel

With finishing mills maintaining schedules at recent levels, the movement of semi-finished grades still is fairly steady. Sheet bars are in demand, particularly from non-integrated sheet and strip mills. Third quarter contracting at the new prices has not yet gotten under way, and is probably delayed largely by labor unsettlement.

Bolts, Nuts and Rivets

Third quarter prices will probably be announced about June 20. In the meantime, producers hope to establish a code for the bolt and nut trade. Although bolt and nut manufacturers have had to absorb higher steel and labor costs, it is considered unlikely that advances in the present scale of prices will be effected for next quarter. Miscellaneous small-lot business accounts for the only movement other than releases against second quarter contracts. The outlook for third quarter trade is somewhat uncertain, with most producers expecting a decline from the present quarter's volume.

Rails and Track Accessories

Bids will be opened this week on the Pennsylvania Railroad's miscellaneous requirements of steel, which includes an indefinite tonnage of track spikes, tie plates, etc. The market is bare of any sizable inquiry for rails and companion fastenings. Releases against orders are fairly well sustained.

Bars

Although lacking notable support from motor car manufacturers, aggregate specifications for soft steel merchant bars are fairly heavy. Most of these specifications are against second quarter contracts entered at 1.75c. a lb., Pittsburgh. Some tonnage has been booked at the new price of 1.90c. a lb., Pittsburgh, which applies through third quarter.

Activity in billet steel reinforcing is sustained by specifications against general contracts, placed at lower prices, which must be completed by June 30. Some fairly large tonnages still pend. Pennsylvania State road work accounts for about 3000 tons of prospective tonnage, on which bids will be submitted June 15. Billet steel reinforcing, in cut lengths, as quoted by distributers, is now posted at 2.05c. a lb., Pittsburgh, for delivery through third quarter.

Sheet Piling

Bids will be opened June 18 for the construction of the Grand Coulee Dam in Washington, which is expected to take 10,000 to 15,000 tons of sheet piling. About 1000 tons for the Matanzas Inlet Dike of the Intercoastal Waterway in Florida has been placed with Inland Steel Co. Producers are now uniformly quoting 2.15c., Pittsburgh, for delivery through third quarter.

Cold-Finished Steel Bars

Although specifications are well diversified, aggregate tonnage is tending downward. Reduced volume cannot be attributed to further change in automotive tonnage, which some weeks ago declined sharply to its present low point. In the case of agricultural implement manufacturers, some tonnage that had been withheld because of drought conditions have been released, but aggregate volume from this source has undoubtedly shrunk as a direct result of the dry spell.

Plates and Shapes

A slight gain in activity in the plate market is reported. Part of the improvement is traceable to repair work, and to projected construction of river craft. About 650 tons of plates will be needed for 44 pontoons for Vicksburg, Miss., while 750 tons will be required for repairing Carnegie Steel Co. coal barges.

The structural market in this district is featured by the award of 2060 tons to Fort Pitt Bridge Works Co. for the Youngstown Sheet & Tube Company's strip mill at Struthers, Ohio. Fresh inquiry is well spread and lacks individually important tonnage.

Tubular Products

Shipments of oil country goods continue to lead in a substantial movement of most tubular products. In one case, a pipe mill is sold up on certain items of oil country material. Standard pipe is also in good demand. Other tubular products, though not so active, are moving steadily. The Pennsylvania Railroad is taking bids on its third quarter requirements of pipe and tubes, not to exceed 150 tons. The new method of quoting seamless steel

commercial boiler tubes and locomotive tubes, and lap welded steel pressure tubes is being favorably received, because of a more comprehensive setup of prices. Pipe mills are maintaining the heaviest operating schedules thus far in the current year.

Wire Products

This market is displaying mixed tendencies. Some consumers are evidently heeding the possibility of a strike, and are specifying fully against contracts. Other releases are based largely on price saving, represented in contracts placed early in the quarter at old prices. On the other hand, the drought has affected the movement of rural wire goods. The automotive industry has also lagged in its takings of manufacturers' wire and spring wire. Wire mesh for road construction is not an important factor in the present market. Practically no wire business has been reported for third quarter.

Sheets

A slight improvement in releases from the automotive industry and sustained specifications from miscellaneous sources are holding sheet mill operations at 70 per cent of capacity. After the middle of June some mills probably will be out of the market, except for sizes of sheets that can be shipped from stock. An unusual feature is a good demand for galvanized sheets for repairing water tanks in agricultural areas, where water storage facilities are of paramount importance during the drought. Third quarter contracting has not gained noticeable headway, and is not expected to involve important contracts until the present uncertainty of labor difficulties is lifted.

Tin Plate

Welcome rainfall in some drought stricken districts and the continued threat of a steel strike have apparently driven in further ample specifications. Operations in the current week are resultantly higher at a strong 75 per cent of capacity. There is some doubt that this rate will hold for any length of time, particularly because results of the long dry spell are not yet measurable in actual tin plate consumption. The direct results will probably be felt later on during the summer.

Strip Steel

Backlogs are considered sufficient to maintain at least the current average operating rate for the strip mill group of around 60 per cent of capacity. Some mills are sold up for the rest of the month, while others are open to acceptance of limited tonnages. Automotive tonnage has declined further, while miscellaneous releases are still steady. Third quarter buying probably will be deferred by most consumers until present uncertainties, particularly respecting labor, are cleared. In some cases the threat of a steel strike has influenced consumers to withhold specifications against June quotas, but the general tendency is to specify liberally in order to save $5 to $8 a ton on their purchases.

Coal and Coke

Activity in the fuel markets continues to be devoid of important trading. Large and small consumers appear to be uninterested in further commitments, despite a definite general reduction in stock piles. Inquiry for slack is very limited, as is interest in both furnace and foundry coke. A 40c. reduction to $3.35 in the price of crushed Connellsville beehive coke for summer delivery has not induced any buying.

Scrap

Trading is practically restricted to dealer covering against orders. The strike threat and the approach of third quarter, the outset of which is expected to bring a lull in mill activity, are defeating hopes of any immediate major mill buying. In the absence of fresh transactions during the past seven-day period, prices are unchanged with the exception of railroad specialties which are down 25c. a ton on a recent sale. The Pennsylvania Railroad monthly scrap list, which appeared later than usual this month, contains about 32,000 tons, including 8400 tons of No. 1 heavy melting steel. Tenders will be received tomorrow. The immediate course of the scrap market will probably depend largely upon the outcome of labor uncertainties. But in the event the threatened strike is averted it is doubtful that concerted buying will occur, particularly in view of the exceedingly slim backlogs of most steel mills at the beginning of third quarter. Correction: Heavy melting steel at Pittsburgh, under date of June 5, in THE IRON AGE comparison of prices, should have been quoted at $11.75 instead of $11.50.

Output Unchanged In South

BIRMINGHAM, June 12. — Even though books are open for the third quarter, pig iron buyers are more interested in the remaining balances of their present contracts than in forward tonnage. There has been some buying for the next quarter, but these contracts are relatively small and do not mark the beginning of a new buying wave. Foundries are going to take as much as possible of their remaining contract tonnage, in view of the present higher price, $14.50. This is also the base for the third quarter.

June shipments have been good to date and it is expected that the month will show quite an improvement over May. Current buying is small and scattered. Furnace operations are unchanged, with 10 stacks active.

Birmingham cast iron pipe plants are looking forward to a San Francisco letting, scheduled for June 15, which involves about 9000 tons. Current new tonnage and releases are not much ahead of May. Several PWA projects, on which bids have been taken so far this month, are in suspension as costs ran ahead of estimates and money available.

Steel

Specifications continue very satisfactory, with the result that production and shipments are steady and favorable. New tonnage is light. Within the past week dealers and jobbers have been in a quandary about ordering against contracts immediately or waiting until later in the month. This condition has resulted from the uncertainty of the proposed strike. Last week 15 open-hearth units were worked, and the same number will be worked this week.

Little Interest in Third Quarter at Cincinnati

CINCINNATI, June 12. — While third quarter business is still light, consumers of pig iron are eager to take all material ordered for second quarter. New business, however, showed a slight gain, totaling about 350 tons. Foundry operations are still discouraging, although prospects are good. Prices on Northern and Southern iron are firm at quoted schedules. The temptation to ship Southern iron at Birmingham rates and truck it across the river is academic, furnace agents here adhering firmly to schedules of 38c. under delivered prices from the nearest Northern basing point.

Coke

Foundry coke continues to move actively on contract. Sales are small and urgent.

Steel

Third quarter bookings for sheets are very small, but some users are in the market for additional second quarter tonnage, taxing mill production in certain grades. Except for demand from two small car manufacturers, automotive specifications are tending downward.

Scrap

While dealer's bids are unchanged, scrap activity is low. There is little speculative buying.

Chicago Rate Maintained At 69 Per Cent

But Recession of Specifications Indicates That Crest of Current Movement Has Been Passed—Pig Iron Shipments Heavy

CHICAGO, June 12.—Once again production of finished steel has leveled off, output standing at 69 per cent of capacity for the second consecutive week. Specifications are lighter and, with the end of the quarter little more than two weeks off, it is realized by producers that the crest of the spring wave has been reached if not actually passed.

New prices are all in effect and there is a notable lack of interest in forward commitments, this situation being a rather natural effect of clauses in the revised code that favor the consumer. While some contracts are looked for, it is thought by sellers that the bulk of new buying will be more or less on a monthly requirement basis.

Business men in general are again suffering a bad case of the jitters, brought on this time by the labor situation. The steel workers' threat would, in itself, be serious enough, but added to it are numerous strikes, now in full swing, which do not receive national attention but which are of great concern to the communities in which they occur. Milwaukee, long a model city in its relations with labor, is at the moment having serious difficulties. The net result of all this is a sharp downward trend in such private business as had been coming into the market.

If the scrap market can be taken as an indicator, a slightly better picture can be painted. After weeks of extreme dullness, a steel mill has purchased scrap and there is some foundry buying. While prices have not advanced, they do give the appearance of having reached a more stable footing, which the trade believes they will hold unless the labor situation is not clarified.

Pig Iron

Consumers are rushing in specifications and there seems every reason to expect June shipments against old contracts to double the volume moved in May. Third quarter prices are established at $18.50 a ton, for the No. 2 Northern foundry grade. Forward buying, as expected under the new code rulings, is extremely light.

Reinforcing Bars

Private capital, though not having progressed far in this market, is again being withdrawn. About the limit of its support now is the occasional erection of a two or three-story structure on the site of an old and taller building which can no longer carry its tax burden. All active work is confined to State highway construction. General contracts have been awarded by Cook County, Ill., which call for 1000 tons of bars. Eight bridges in Illinois call for 200 tons and additional lettings are due this month. Sanitary District work in Chicago is held up pending court action.

Cast Iron Pipe

Awards in this district total about 2000 tons, of which 1100 tons was bought by Chicago, which is now in the market for special castings for pipe sizes ranging from 3 to 24 in. On the whole the local market is quiet, though there is a larger number of small orders. To the west and northwest of Chicago, there is more activity. Prices for all sizes remain unchanged.

Rail and Track Supplies

Rail output has been reduced three points in a move to spread production over the next three months. Except for current specifications the market is quiet, no new buying having been recorded for several weeks. Track accessory orders are heavier, totaling close to 5000 tons.

Wire Products

Rather general rains have fallen over much of the drought area, but their benefit is principally to pastures inasmuch as many acres of grain are past saving. This situation, combined with the fact that the season for general repair work is past, forecasts a sluggish wire products trade in most rural areas. Orders from jobbers are small and scattered. Sellers are watching closely for the effects of the revised code. It is generally believed that the incentive for quarterly contracting has been in a large measure destroyed and that most users will buy from month to month. There is still a steady flow of tonnage to the manufacturing trade and wire mills are amply supported at 60 per cent of capacity. Third quarter price schedules went into full effect on Monday. Buyers are showing little interest in their future needs.

Sheets

Mills are wrestling with crowded order books. No new business for delivery in June can be taken and there is serious doubt that all the second quarter tonnage specified to date can be shipped.

Plates

A number of tank awards ranging from 200 tons to over 400 tons have served to liven this market. Also, the Harnischfeger Corpn., which will build cranes for Boulder Dam, has ordered 600 tons of material. While the railroads are believed to be in need of considerable additional equipment, there is not a single new project in the West on which steel mills can depend for a round tonnage. Tank shops find business spotty and most of them are badly in need of work.

Structural Material

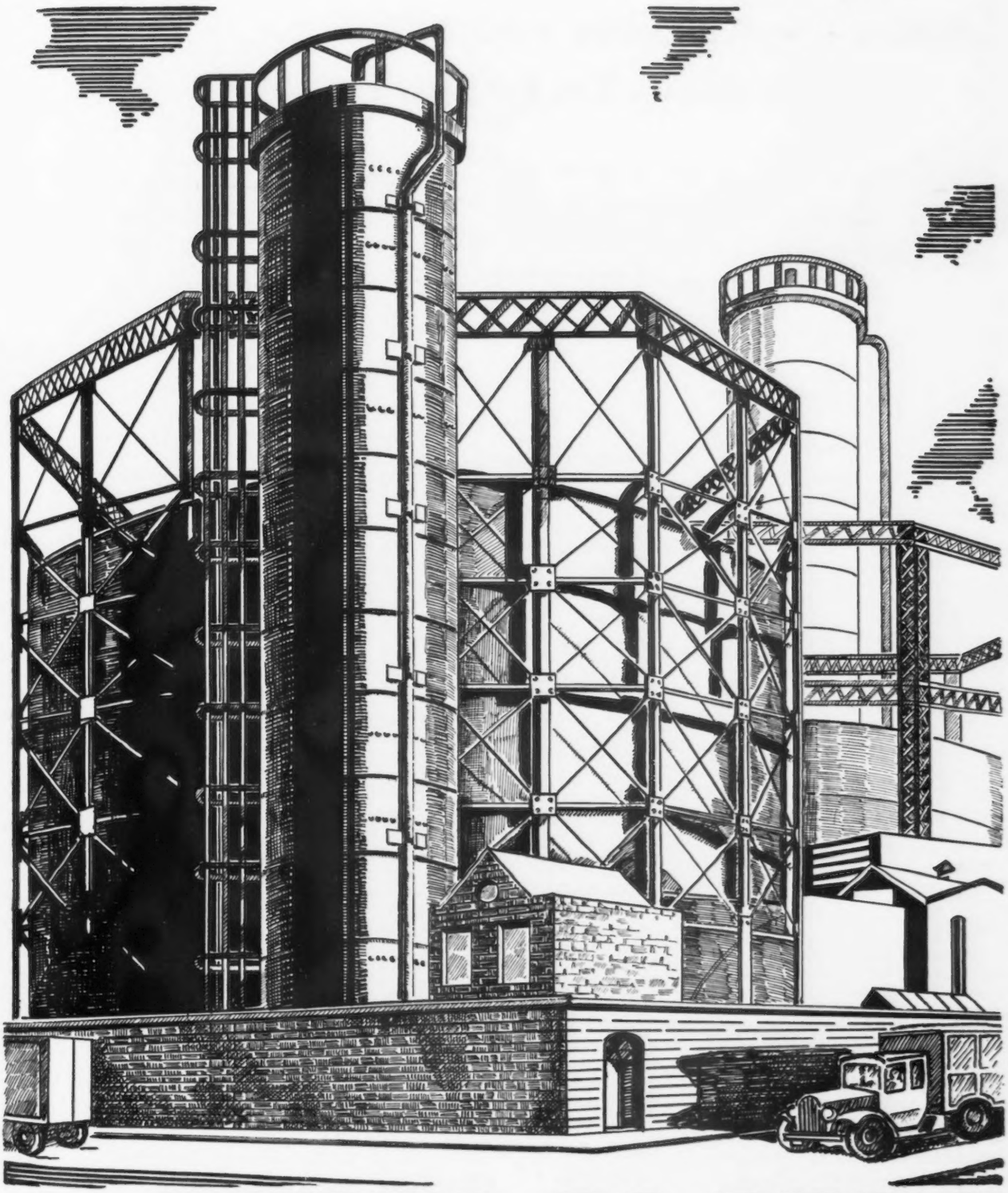
Awards total 7000 tons, of which 1400 tons is accounted for by the rebuilding program at the Chicago stock yards. Most projects, however, continue to be financed with public money. Outstanding in the 6500 tons of fresh inquiries is 2500 tons for bridges that will be built by the State of Illinois. Indiana also has a small program.

Bars

There is still a good movement of bars but mills believe that the peak of demand has been passed. Farm implement manufacturers are crippled by the drought and resultant curtailment of farm income. Automobile manufacturers, though attempting to stimulate sales by lowering prices, must acknowledge the true situation by reducing their steel specifications. The price advantages of old commitments and the uncertainty of the labor situation are leading miscellaneous consumers to stay in the market.

Scrap

After weeks of fogginess in the matter of prices a small tonnage of heavy melting steel has been taken by a steel mill at $10 a ton delivered. This purchase has steadied the market, though there is no prospect of real activity until the steel workers and steel producers reach terms that assure uninterrupted production. Little scrap is moving to Milwaukee, where labor troubles are daily growing more serious. Chicago foundries, benefiting momentarily from the situation in Milwaukee, are taking some additional scrap. A boatload of scrap has left a Chicago dock but other similar consignments have not been released.



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Steel Pipe Releases Improve In New York District

Can Companies Have Three Months' Supply of Tin Plate — Navy Will Build 24 Additional Vessels

NEW YORK, June 12. — Steel specifications in this district have shown no further expansion except possibly in pipe. Releases of pipe from the oil companies have shown sufficient betterment to warrant the belief that a resumption of capital improvements in the oil fields may be getting under way.

Stocking of steel because of the threatened strike is most marked in tin plate and sheets. Can companies are said to have three months' supply of tin plate either on hand or at mill warehouses awaiting shipment. The extent of inventory accumulations in the heavier products is difficult to estimate. Some stimulation of plate specifications is ascribed to the report that plate extras may be revised upward during the third quarter.

The steel industry will get further support from the navy if a new program calling for 24 additional vessels meets with favorable action in Congress. Funds for one heavy and three light cruisers are already provided for in the current navy appropriation bill. Two destroyer leaders, 12 destroyers and six submarines are expected to be financed by the deficiency appropriation bill now pending.

Pig Iron

Despite the lack of incentive for buyers to book third quarter iron some tonnage has been placed as the result of intensive selling activities on the part of leading furnace representatives. About 950 tons was booked last week for third quarter delivery, as compared with sales of 1400 tons in the preceding week and 650 tons sold a fortnight ago. Local sellers estimate that jobbing and integrated foundries in this territory are now operating at 40 per cent of capacity as compared with 50 per cent a month before. The revised code has considerably altered selling provisions, and the market henceforth will be characterized by more prompt transactions instead of heavy bookings during certain periods. No base price can be advanced during a quarter but reductions can be filed and used promptly. Therefore only four price advances are possible during one year whereas a buyer can always hope for one or more reductions during a quarter.

Reinforcing Steel

Very little business has been placed during the week but impressive tonnages are in prospect. About 1100 tons of mesh will be awarded at Albany, N. Y., during the week, and the City of New York has closed bids on 1000 tons of bars for miscellaneous work in five boroughs. A disposal of about 270 tons should be announced soon for schools at Queens and Lydonville, N. Y. The New York Central Railroad will shortly distribute plans for enclosing its west side Manhattan tracks, and the project is estimated as involving about 3500 tons of reinforcing steel.

Scrap

Domestic mills have melted a large portion of their scrap reserves but they are, nevertheless, entirely unwilling to consider replacement orders. Consequently local brokers are buying practically nothing for domestic accounts. A little No. 2 heavy melting steel is being purchased at $6.60, Jersey City, for the Coatesville, Pa., mill and some heavy breakable cast is being loaded on barge at Jersey City at $7.50 for shipment to Bridgeport, Conn. The remainder of the list remains inactive and quotably unchanged. Japanese and European users are uncertain as to the industrial trend here and are consequently less active buyers. Nevertheless local brokers are not particularly anxious to sell abroad beyond early August as there is a feeling that prices may rapidly return to higher levels after strike threats are diverted. This buying market, however, will continue to be supported fairly well throughout July as the aggregate export backlog in this district covers shipments for that period.

Pig Iron Shipments Gain at Buffalo

BUFFALO, June 12.—An increase in pig iron shipments is ascribed to the possibility of a steel strike and also to the fact that iron received after June 30 will take higher prices. June is expected to be one of the heaviest shipping months in a long time. New business is very quiet, with no sizable sales.

The new basing system on Bessemer ferrosilicon and silvery is now in effect. This means that the Buffalo base and freight to destination and the Jackson base and freight to destination are figured and whichever gives the lower delivered price is the price the buyer pays.

Operations remain almost the same as last week in Buffalo steel mills, except that, at Lackawanna, Bethlehem has reduced to 15 furnaces and, in South Buffalo, Republic has increased to four open-hearths. Wickwire-Spencer Corpn. is operating one open-hearth on full time and another on short time. No sizable commitments are reported in the field of fabricated structural steel or reinforcing bars.

The scrap situation is very quiet, with no sales and no offerings. Most of the mills are still suspending shipments, though barge shipments are understood now to be pretty well cleaned up. While scrap has been pouring into mills via water, operations have been consistent and it is not believed that mills are accumulating any large surpluses. If operations are not interrupted, scrap dealers believe the mills will again come into the market after July 1.

Boston Scrap Market Has Improved Tone

BOSTON, June 12.—Third quarter pig iron sales so far this month have not exceeded 1000 tons according to local furnace representatives. Furnaces are busy, however, making shipments on second quarter contracts. The New England melt is just about holding its own. Molders of the Vulcan Iron Works, New Britain, Conn., are on strike. Otherwise New England foundries are notably free from labor troubles.

No. 1 and No. 2 steel scrap for Pennsylvania delivery sentimentally is a little firmer, but few actual sales are noted. The American Steel & Wire Co., Worcester, Mass., is now paying $7.50 a ton delivered for No. 1 steel, and $6.50 for No. 2, while brokers with old contracts are paying about 25c. a ton more for material. Breakable cast for New England consumption is $8 a ton delivered, and for Pennsylvania delivery $6.50 a ton on cars. The bulk of bundled skeleton and busheling bought the past week was $3.75 a ton on cars. For chemical borings $8 a ton, f.o.b., is generally quoted, although occasionally a little more is paid. With Worcester buying and a little more inquiry for Pennsylvania shipment, the scrap market looks better than it did a week ago.

Cleveland Operations Hold At 63 Per Cent Rate

Unless the Threatened Strike Interferes, Mills Will Be Able to Ship All the Tonnage Ordered for June Delivery—Pig Iron Shipments Gain

CLEVELAND, June 12.—Specifications for finished steel have tapered off, as most consumers have issued releases for all the material they will take against second quarter contracts. However, the demand for some products, particularly pipe, bars, and wire products, was well maintained during the week. Mills have about all the sheet and strip steel tonnage on their books that they can produce by June 30, the deadline date for shipment against second quarter contracts. Some producers still have open capacity for bars, plates and shapes and will continue to take orders for these products as long as they can accept specifications for June shipment. The warning of produers last month urging consumers to get their specifications in promptly was so generally heeded that releases this month probably will be lighter than in May. Unless operations are interfered with by a strike, mills will be able to ship all the tonnage ordered for June delivery.

Ingot output in the Cleveland-Lorain territory is unchanged this week at 63 per cent of capacity. Most consumers will take out about all the steel covered by their second quarter contracts. Some are laying in moderate stocks, but others will not order steel beyond their early requirements. These prefer to pay the increase in prices later rather than to put in stock that they may not need. If orders from their customers are not forthcoming in time to get steel at present prices the increased cost of steel will be passed along.

The automotive industry is apparently not stocking up much beyond July requirements, the only exception to this policy being one consumer that has placed a heavy tonnage of cold-finished and cold-rolled sheets and cold-rolled strip for its requirements through the remainder of the year. This company is also reported to have placed 1,000,000 automobile wheels for delivery during the last six months.

There has been a little increase in small-lot orders for sheets for July shipment from consumers who previously had specified the full amount of their contracts. However, no third quarter contracts are being closed, as there is no incentive for consumers to do so.

Pig Iron

Shipments show an increase over May and are expected to be fairly heavy through this month. Most consumers, it is believed, will take out about all the iron covered by their second quarter contracts placed at $1 a ton below present prices, thus accumulating stocks that will carry some of them well into the third quarter. No contracts have been taken for the third quarter since books were opened for that delivery, and new demand is expected to be very light for several weeks.

Bars, Plates and Shapes

Specifications held up fairly well the past week, although the rush to get in orders in time for June shipment has subsided. Activity in the structural field continues fair. The Youngstown Sheet & Tube Co. has placed 2000 tons for its continuous hot-rolled strip mills. Cleveland contractors have submitted low bids for the Rundel memorial building, Rochester, N. Y., requiring 1800 tons of structural shapes, and for a Government breakwater in Fairport, Ohio, taking 1000 tons of sheet steel piling. Five bridges requiring 350 tons of shapes are included in a new list of projects for which the Ohio Highway Commission has asked for bids.

Sheets

Some small-lot orders for July shipment have been placed at the new prices, and a few inquiries are pending for third quarter contracts. However, with labor troubles brewing, producers are inclined to defer making commitments for the quarter. Specifications are about all in against second quarter contracts and sales departments are devoting their attention largely to looking after shipments. Most consumers have issued orders for about all the tonnage covered by their contracts. Mills generally will be able to produce all the sheets now on order for shipment before July 1, provided operations are not interfered with by a strike.

Strip Steel

Specifications against second quarter contracts have about all been released and mills have about all the tonnage on their books that they can ship by June 30, although some producers can still take certain sizes. Several of the automotive plants have released as much strip as they did during the last month of the first quarter. In view of the price advance, not much contract tonnage is being left unspecified. No third quarter contracts have been closed.

Bolts, Nuts and Rivets

Rivet manufacturers have reaffirmed present prices for the third quarter, these being $3 per 100 lb., Cleveland or Pittsburgh, $3.10, Chicago, and $3.15, Birmingham, for large rivets, and 70 and 5 per cent discount for small rivets. Demand shows a fair increase because of orders from car builders and railroads. Bolt and nut manufacturers will defer naming third quarter prices until about June 20. Orders for bolts and nuts have fallen off this month.

Iron Ore

Shipments from docks of Lake Erie ports during May were 1,264,446 tons as against 352,917 tons during May last year. Receipts at these docks last month were 1,467,591 tons as against 447,801 tons the corresponding month a year ago. Receipts at other than Lake Erie ports, mostly at Lake Michigan ports and Detroit, were 682,743 tons as compared with 353,175 tons during the same month last year. On June 1 there was 4,379,795 tons on Lake Erie docks as against 4,906,953 tons on the same date a year ago.

Scrap

There is no new consumer demand and little activity is looked for until the labor situation in the steel industry is cleared up. Not much scrap is due mills on outstanding contracts. Local mills continue to take blast furnace scrap. Restrictions on deliveries are still in force in the Youngstown district. Prices have not declined further but quotations are nominal. Small lots of distress scrap are moving at slightly below quoted prices. Some dealers, apparently thinking that prices have touched bottom, are buying small lots for yard stocks.

Panama Rail and Angle Bids Postponed

THE Panama Canal has postponed from June 13 to June 27 the date for opening bids on 1400 tons of rails and angle bars. Bids for track material, however, will be opened on the original date, June 13.

Philadelphia District Steel Output Advances

Production Up to 46 Per Cent of Capacity as Consumers Press for Deliveries Against Low Priced Contracts

PHILADELPHIA, June 12.—The threat of a steel strike, coupled with the approach of higher prices in the third quarter, is still being felt in this district. Two independent mills have increased their steel production this week, while others are maintaining recent operating rates in order to meet the demands of finishing mills. Steel ingot output is therefore estimated at 46 per cent of capacity, compared with 45 per cent last week, while finishing mill schedules are generally higher than they have been.

Mills in this district are not greatly concerned over the threat of a steel strike. At only one point can the Amalgamated claim a large percentage of workers, while at other plants efforts to organize have begun in the last fortnight. It is recognized that the strike might spread to this territory if it gained a strong foothold in the West, but local producers expect no such eventuality.

Specifications against old contracts constitute the principal activity in this territory. With code changes now effective, the incentive to contract in advance is lacking, and mills are making no effort to cover their customers for third quarter. It is believed that purchases will hereafter be made only to cover immediate needs and in that manner heavy buying to avoid price increases will be avoided.

Pig Iron

The foundry melt in this district is declining. However, consumers are specifying against old low-priced contracts and a few sellers now have shipping instructions to cover all the iron they sold during April at the old prices. Forward buying is entirely lacking.

Imports

The following iron and steel imports were received here last week: 2281 tons of chrome ore from Cuba, 198 tons of pig iron from British India and 10 tons of cold-drawn steel wire from Sweden.

Bars, Plates and Shapes

The McClintic-Marshall Corpn. has taken 3200 tons of shapes for the third section of the high-speed approach to the Delaware River Bridge, while the Kalman Steel Corpn. has been awarded 1600 tons of piling and 400 tons of reinforcing bars for the same project. No other outstanding building jobs are before the trade and activity in bars and shapes is confined to small miscellaneous business in which PWA projects predominate. Road work is still an important factor and Pennsylvania is opening bids this week on a number of highway jobs which will take a total of 500 tons of bars. Plates are quiet, although shipments to the large shipbuilding plants in the district are well sustained. The Navy Department is reported to be prepared to ask for bids in the near future on a large program in which local builders are expected to share.

Sheets

The market is very quiet from the standpoint of new business and producers are now unable to take additional tonnage for shipment in the present quarter. Shipments of tin plate are very heavy, but consumers are well stocked for the summer and third quarter production will undoubtedly decline sharply.

Warehouse Business

Sales out of warehouse have not declined appreciably this month, but sellers expect a falling off during July. Sheets and reinforcing bars have been comparatively active.

Scrap

Purchase of 3000 tons of No. 1 heavy melting steel by a steel company in the district has confirmed the recent quotation. No other sales have been reported, but the market is no longer weak and further price declines are not expected. No. 2 steel is particularly strong, but carwheels and shafting have declined on the basis of recent sales.

St. Louis Mill Buys Additional Scrap

ST. LOUIS, June 12.—Sheffield Steel Corpn. has bought an additional 2500 tons of No. 2 heavy melting steel at $7.50 per gross ton for use in its plant here, making a total of 4000 tons this interest has purchased since it began operating a part of the Scullin plant. As a result dealers have reduced their buying prices of this grade 50c. a ton. Otherwise the market is quiet, dealers and mills marking time pending an adjustment of labor problems in the steel industry. The Missouri Pacific has a list of 75 carloads of scrap.

Eleven open-hearth furnaces are now operating in the St. Louis industrial district, a reduction of two from the preceding week. The melt of pig iron is holding up well, despite a slight decline in the operations of foundries catering to the agricultural implement and automotive trades. A 10 per cent increase in wages of the 1900 workers in the stove foundries in Belleville, Ill., will be put into effect June 18, and at the same time manufacturers have announced a 7½ per cent increase in prices. Foundries are operating with full forces to supply customers anticipating the rise in prices.

The Granite City Steel Co. has sold up its capacity in all grades of sheets for shipment during June. Business in plates is light, but is still better than it has been. Tin plate demand is fair.

The State of Illinois will open bids June 19 for highway projects requiring 2664 tons of structural steel and 100 tons of reinforcing bars, and the State of Missouri will open bids June 15 for highway work requiring 300 tons of structural steel and 150 tons of reinforcing bars. Fruin-Colnon Construction Co. has been awarded the contract for the Oakland Avenue viaduct, St. Louis, requiring 200 tons of structural steel and 125 tons of reinforcing bars.

Detroit Scrap Mart Has Better Tone

DETROIT, June 12.—A slightly better feeling predominates in the local scrap market, although purchases by consumers remain virtually at zero. A few releases on current contracts have been given by steel mills, and scrap is beginning to move by boat from Detroit to Lake Erie points at a slightly better rate. Prices continue at the levels established a week ago, with dealers paying $7 to $7.50 for heavy melting steel and hydraulic bundles.

OBITUARY

FRED C. ECKWORTH, Cleveland manager of the Crocker-Wheeler Electric Mfg. Co., died at the University Hospital in that city on June 1, aged 49 years. He had been a member of the Crocker-Wheeler sales force for 18 years, nine of which as Cleveland manager of the company.

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WILLIAM J. FERRIS, LaCrosse, Wis., prominent in American electrical engineering for many years, died June 1, aged 72 years. He was born in Scotland and came to America in 1879, becoming a pioneer in the development of electric power and light production. For 19 years he was associated with General Electric Co. in Chicago, and for seven years with Electric Bond & Share Co., in charge of its electrical properties in Panama. He retired in 1926.

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FRED W. BUNTS, who had completed over 30 years in the sales department of the Chicago office of the Jones & Laughlin Steel Corpn., died June 7. He was a native of Ohio. For several years he served the Warner & Swasey Co., Cleveland, and later was in the sales department of the American Sheet & Tin Plate Co.

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GEORGE T. DEWEY, who had served as president of the Baldwin Chain & Mfg. Co. and Graton & Knight Mfg. Co., and as treasurer of the Wright Wire Co., died at his home in Worcester, Mass., on June 5. He was born in that city Sept. 12, 1858, was graduated from Williams College in 1879, and from Harvard Law School in 1882.

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JOHN L. HANNAN, sales manager, Pittsburgh Tube Co., Pittsburgh, died at his home at Bradford Woods, Pa., on June 7, aged 54 years. He had been associated for many years with C. A. Turner, Inc., and the Fairbanks Co., at Pittsburgh.

New Federal Projects Are Feature on Coast

SAN FRANCISCO, June 11.—Two new projects, estimated to cost more than $14,000,000, have been added to the list of Federal construction work. Bids are to be taken soon by the Bureau of Reclamation at Denver on the Alcova Dam, which is to be built on the North Platte River near Casper, Wyo. Approximately 2000 tons of steel will be used in construction. The Rye Patch Dam, to be located on the Humboldt River near Lovelock, Nev., will require 1000 tons of steel. Bids are being taken this week on the Grand Coulee low-level dam and power plant near Almira, Wash., for which 23,950 tons of steel is specified.

Reinforcing steel was advanced $1 per ton today to 2.50c. f.o.b. cars dock. No immediate increase is anticipated on other mill prices. It is reported that scrap purchases have shown a slight slackening, although ingot production has not declined. Movement of structural steel and reinforcing bars has been confined largely to Governmental work, with only light plates and sheets enjoying a fair degree of industrial demand. Warehouse business continues at a steady pace.

Pipe Lines

United States Engineer Office, Buffalo, closed bids June 13 for soft steel suction pipe.

Empire State Refining Corpn., Bolivar, N. Y., F. R. Beckwith, president, is considering extensions in steel pipe line in connection with expansion of oil refinery and other properties. Cost over $50,000.

Morris-Van Keuren Oil & Gas Syndicate, Book Building, Detroit, is considering steel pipe line in connection with development of oil and natural gas properties in Vernon Township, known as Bowman Estate Lease. Company will establish branch offices at Mount Pleasant, Mich., to carry out work.

United Gas Public Service Co., Lake Charles, La., plans steel pipe line from new local oil refinery of Shell Petroleum Co., St. Louis, to connection with new booster station in Woodlawn district, then to connection with main trunk pipe line in southwestern Louisiana. Cost over $80,000 with booster station and auxiliary buildings.

Sun Oil Co., Yale, Okla., with headquarters at Philadelphia, plans new 4-in. welded steel pipe line from oil wells in Starr County, Tex., to new tank farm in another part of county.

United States Engineer Office, Vicksburg, Miss., closed bids June 12 for 65 sections, each 52 ft. long, 30-in. i.d., steel pontoon pipe.

Guymon, Okla., is placing contracts for new 13-mile steel pipe line for municipal gas transmission and distribution. F. E. Devlin, W-K-H Building, Wichita, Kan., is consulting engineer.

Endows Research On Battledeck Floors

AMERICAN Institute of Steel Construction has decided to endow a research fellowship at Lehigh University, which goes into effect immediately and be extended over a period of two years. The work will relate to research on steel floor construction and will involve the design of battledeck floors, made of flat steel plates welded to steel beams, to carry concentrated live loads.

During the past several years the American Institute of Steel Construction had the National Bureau of Standards carry on a comprehensive research on battledeck floors, which developed valuable data regarding fireproofing and behavior under distributed loads. The fellowship at Lehigh University will continue this work and develop it in the particular field of bridge floors.

The investigation on the flat steel plate floor will be carried out under Prof. Inge Lyse of the Department of Civil Engineering at Lehigh in consultation with the Technical Research Committee of the American Institute of Steel Construction. The personnel of this committee includes Aubrey Weymouth of Post and McCord, Inc.; Jonathan Jones of McClintic-Marshall Corpn.; J. R. Lambert of Phoenix Bridge Co.; Dr. O. E. Hovey of the American Bridge Co.; H. G. Balcom, consulting engineer of New York, and F. H. Frankland of the American Institute of Steel Construction.

Egler Ingot Shaker

IN the course of a paper by Eric R. Mort, Swansea, Wales, on the manufacture of full-finished steel sheets, read before the (British) Iron and Steel Institute, the author had the following to say about the Egler ingot shaker developed at the Brier Hill plant of the Youngtown Sheet & Tube Co.:

As the steel is poured into the mold the latter is shaken by a machine capable of giving 30 to 60 bumps of about ½-in. vertical travel per minute. The frequency of bumping and the amount of vertical travel will vary with the degree of wildness of the heat being treated, but it is thought that this problem has not yet been solved satisfactorily. An inspection of shaken steel yielded the following results:

(1) From all indications, the shaker does accomplish the removal of gases and possibly some nonmetallics from the steel.
(2) Shaking produces a thick skin about 4 in. thick at the bottom of the ingot.
(3) The added density produces an additional weight of from 500 to 1200 lb. over the unshaken, top-poured ingots of the same volume.
(4) Segregation is found, but no lower in the ingot than in unshaken steel.
(5) Shaking permits rolling at a higher temperature than the normal, and probably simplifies the heating of the ingots in the soaking pits. A blooming temperature of 1230 deg. to 1260 deg. C. is permissible on shaken steel, while about 1040 deg. C. is the practice on unshaken steel—the higher temperature is probably beneficial to the surface.
(6) Surface cracks are apparently absent. Poor-looking ingots from the standpoint of bad mold marks and splash marks result in good-looking sheet bar, due to the possibility of "washing" the ingots in the pits without danger of overheating or burning.
(7) The ingot-to-bar yield is raised.
(8) Rejections on bar-to-bar inspection dropped considerably after the installation of the shaker.
(9) Steel never rises in the molds when poured on to the shaker.
(10) A comparison of shaken and unshaken steel showed no advantage to the former on the basis of inspection of full-finished sheets.

Copper Buyers Enter Heavy Commitments Preceding Price Advance to 9c., Valley

Quiet Spelter Sales Made Through August at 4.60c.—Large Lead Purchases Made—Tin Inactive as Price Moves Lower

NEW YORK, June 12.—All important participants in the copper code have filed advances of ½c. with the copper authority, and electrolytic is now quoted at 9c. a lb., delivered Connecticut Valley. The filings were made over a period of several days and consumers took full advantage of the delay in order to enter heavy commitments at the 8.50c. level. Most of the bookings called for August-September delivery, indicating that fabricators have no immediate use for the metal. The process of filing and the uncertainty incident to a naming of an arbiter for the industry have resulted in considerable market confusion. As a few sellers have not filed new prices, there is probably some Blue Eagle metal still available at 8.50c. Whether the quantity is of any importance or whether it is even being sold have not yet been ascertained. The foreign market has shown little activity during the week despite slowly advancing quotations. Both Katanga and United States interests are aggressively offering metal, but European consumers apparently are in no mood to purchase in volume as a protection against possible price increases. The London market this morning ranged around 8.20c. a lb., c.i.f. usual Continental ports, which was 15 points higher than a week earlier.

Tin

Official approval was given to the buffer pool last week and the market immediately moved upward. However, no buying was forthcoming from this country and subsequently the price steadily dropped to today's level of 51.25c. a lb., New York. Evidently the major American consuming industries intend to keep inventories as low as possible so long as strikes threaten production, as no inducement seems sufficient to attract sales to importers' books. The buffer pool will make up a stock of 8282 tons from purchases in the open market and a 5 per cent increase in the output of signatory governments. This stock will be bought and sold in an attempt to stabilize prices abroad.

Zinc

Spelter is uniformly quoted at 4.60c. a lb., New York, for competitive business, and leading producers are now in a more advantageous position due to the lower ore market. The demand for Prime Western continues apparently quiet, but a bulge in activity is indicated by the 3500 tons booked last week at 4.25c. for delivery positions into August. These sales compare with 2800 tons in the preceding period and 2400 tons booked a fortnight ago. The flow of zinc into ultimate consumption has not materially expanded. Therefore the increased demand for metal is attributed to the influence of very favorable May statistics. Shipments during May totaled 35,635 tons against 31,948 tons in April, and production advanced 430 tons to 31,000 tons. Producers' stocks of slab zinc were cut 4643 tons, and unfilled orders aggregated 20,800 tons at the end of May as compared with 27,400 tons a month earlier. Ore production in the Tri-State district in the last two months has been more than the industry could absorb, with the result that concentrate prices have recently declined to $25 and $26 a ton for flotation and prime grades respectively. These low prices are discouraging some operators and several mines are being closed. However, any serious curtailment in output will reflect in rapidly declining stocks, and a quick price strengthening would thereby ensue. Last week's production was 7500 tons, sales were 4000 tons, shipments totaled 8150 tons, and bin stocks rose to 18,000 tons.

Lead

Consumers are somewhat fearful of a price advance and, consequently, they have been in the market for heavy commitments, mostly for June shipment. The aggregate bookings of all producers now total over 25,000 tons for June and 8000 tons for delivery during July. The daily demand is still in fair proportions and well distributed, but it is evident that some slackening in sales volume is in prospect for the latter part of the month, inasmuch as only about 7000 tons of June metal is yet to be booked. The price is apparently steady at 4c. a lb., New York, with no immediate change in prospect. Nevertheless, should the statistical position show a favorable trend, an upward price revision would be likely as the present quotation is the lowest for almost a year.

The Week's Prices. Cents Per Pound for Early Delivery

	June 6	June 7	June 8	June 9	June 11	June 12
Electrolytic copper, N. Y.*‡	8.25	8.25	8.25	8.25	8.25	8.75
Lake copper, Eastern delivery*	8.62½	8.62½	8.62½	8.62½	8.62½	9.12½
Electrolytic copper, Connecticut†	...	...	...	....	...	
Straits tin, Spot, N. Y.	51.95	52.65	51.95	..	51.62½	52.25
Zinc, East St. Louis	4.25	4.25	4.25	4.25	4.25	4.25
Zinc, New York	4.60	4.60	4.60	4.60	4.60	4.60
Lead, St. Louis	3.85	3.85	3.85	3.85	3.85	3.85
Lead, New York	4.00	4.00	4.00	4.00	4.00	4.00

*Blue Eagle copper. †Outside market. ‡Refinery; price ¼c. higher in Connecticut Valley.

Quotations below cover wholesale lots, f.o.b. New York.

Aluminum, 98-99 per cent, 22.90c. a lb.
Aluminum, remelt, No. 12 (grade 3), 13.50c. a lb., average for week.
Nickel electrolytic cathode, 35c. a lb.; shot and ingot, remelt electro, 36c. a lb.
Antimony, 7.90c. a lb. Quicksilver, per flask of 76 lb., $75c.
Brass ingots, 85-5-5-5, 8.75c. a lb.

From New York Warehouse

Delivered Prices, Base per Lb.

Tin, Straits pig	53.50c. to 54.50c.
Tin, bar	55.50c. to 56.50c.
Copper, Lake	10.25c. to 11.00c.
Copper, electrolytic	10.00c. to 10.50c.
Copper, castings	9.75c. to 10.75c.
*Copper sheets, hot-rolled	15.50c.
*High brass sheets	14.25c.
*Seamless brass tubes	16.75c.
*Seamless copper tubes	16.75c.
*Brass rods	12.75c.
Zinc, slabs	5.75c. to 6.75c.
Zinc sheets (No. 9), casks, 1200 lb. and over	10.25c.
Lead, American pig	4.75c. to 5.75c.
Lead, bar	5.75c. to 6.75c.
Lead, sheets	7.75c.
Antimony, Asiatic	9.75c.
Alum., virgin, 99 per cent, plus	23.30c.
Alum., No. 1 for remelting, 98 to 99 per cent	18.00c. to 19.00c.
Solder, ½ and ½	32.50c. to 33.50c.
Babbitt metal, commercial grades	25.00c. to 60.00c.

*These prices are also for delivery from Chicago and Cleveland warehouses.

From Cleveland Warehouse

Delivered Prices per Lb.

Tin, Straits pig	55.00c.
Tin, bar	57.00c.
Copper, Lake	9.50c.
Copper, electrolytic	9.50c.
Copper, castings	9.25c.
Zinc, slab	5.75c. to 6.00c.
Lead, American pig	5.00c. to 5.25c.
Lead, bar	8.00c.
Antimony, Asiatic	9.00c.
Babbitt metal, medium grade	19.00c.
Babbitt metal, high grade	59.00c.
Solder, ½ and ½	33.50c.

Old Metals, Per Lb., New York

Buying prices are paid by dealers for miscellaneous lots from smaller accumulators, and selling prices are those charged to consumers after the metal has been prepared for their uses. (All prices are nominal.)

	Dealers' Buying Prices	Dealers' Selling Prices
Copper, hvy. crucible	6.75c.	7.50c.
Copper, hvy. and wire	6.50c.	7.25c.
Copper, light and bottoms	5.50c.	6.50c.
Brass, heavy	3.62½c.	4.37½c.
Brass, light	3.12½c.	3.75c.
Hvy. machine composition	5.25c.	6.125c.
No. 1 yel. brass turnings	4.50c.	5.25c.
No. 1 red brass or compos. turnings	4.37½c.	5.37½c.
Lead, heavy	3.12½c.	3.62½c.
Zinc	2.50c.	3.125c.
Cast aluminum	10.00c.	11.75c.
Sheet aluminum	12.25c.	13.50c.

Electrolytic Pickling Of High-Speed Steel

A PROCESS of electrolytic pickling of high-speed steel that gives promise of commercial success was described by Raymond R. Rogers, lecturer in electrochemistry, Department of Chemical Engineering, Columbia University, New York, in a paper presented to the Electrochemical Society. An alkaline bath of 115 g. of sodium hydroxide and 15 g. of citric acid per liter is used with a current density of 25 amp. per sq. ft. When the gas evolution becomes entirely uniform, the pickling has been completed and the parts are then rinsed with water and dipped for an instant into a hydrofluoric acid solution. What Mr. Rogers had to say was in part as follows:

A high speed steel surface free from oxide and other non-metallic material was desired. Different acid pickling baths were experimented with, but with indifferent success. Hydrochloric and sulphuric acid baths produced surfaces whose dark appearance indicated the continued presence of non-metallic substances. Hydrofluoric acid gave somewhat better results, but it is not a desirable material to work with. To further demonstrate the presence of undesirable substances after pickling with the first two of these acids, a metal was electrodeposited from an acid bath upon the pickled high speed steel surface. The electrodeposited film of metal readily peeled from the surface.

The alkaline anodic method of pickling was found to give results superior to any obtained by ordinary acid pickling. The high speed steels used throughout this investigation were of the general type: carbon, 0.68 per cent; chromium, 4.13 per cent; tungsten, 17.80 per cent; vanadium, 1.07 per cent; silicon, 0.25 per cent; manganese, 0.29 per cent. Some of the material had a tightly adhering mill scale obtained during hot rolling. Other samples had been hot rolled, annealed, pickled in hot 15 per cent sulphuric acid, cold rolled and finally annealed. Still others had been hot rolled, annealed, pickled in sulphuric acid and then pickled again in 12 *N* hydrochloric acid. None of the samples were quenched.

The Pickling Procedure

At the beginning of the electrolysis, no gas is evolved on the high speed steel surface. If, before electrolytic pickling, the surface is covered with a thin, light brown oxide such as is formed on atmospheric exposure after a former electrolytic pickling, the bubbles appear *almost* immediately. But if there is mill scale on the surface, 50 or 60 sec. may elapse before the bubbles appear. When the samples are covered with mill scale or with a coating of oxide due to annealing, most of the covering of oxide is detached from the sample about the time that gas evolution begins.

When the gas evolution is entirely uniform over the whole surface, the pickling has been completed. The sample is then removed from the bath and rinsed with water. The appearance of the surface varies at this stage of the procedure, but it is frequently covered with a dirty-looking material which adheres so firmly to the metal that it cannot be removed with a scrub brush. The sample is now placed in hydrochloric acid solution (6 to 12 *N*) at room temperature, removed from this almost immediately, and finally rinsed with water.

Beginning Next Month the Story of

SPECIALIZED PRODUCTION

COLD ROLLED STRIP STEEL

A series of advertisements picturing and describing the various processes in the manufacture of Thomastrip, covered by the following subjects, will appear regularly in this publication. Watch for them.

FINE SURFACE
PRECISION GAUGE AND WIDTH
UNIFORMITY OF TEMPER
NON-POROUS CRACK-PROOF PLATING
THOROUGH INSPECTION AND TESTING
DEPENDABLE SERVICE

THOMASTRIP

COLD ROLLED STRIP STEEL

Bright Finish · Zinc Coated · Copper Coated · Cadmium Coated

THE THOMAS STEEL CO. • WARREN, OHIO

DIRECTORS of Ludlum Steel Co. have declared out of current earnings the regular quarterly dividend of $1.625 per share on the company's 6½ per cent preferred stock payable on July 2, 1934, to preferred stockholders of record at the close of business on June 22, 1934.

The Federal Court of Appeals for the Fourth Circuit has affirmed the decision of Judge Coleman of the District Court of Maryland in the suit of the American Stainless Steel Co. and Electro Metallurgical Co. against the Rustless Iron Corpn. of America for alleged patent infringement. The lower court held the patents on which suit had been brought against the Rustless company to be invalid and dismissed the complaint.

Prices of Finished Steel and Iron Products

BARS, PLATES, SHAPES

Iron and Steel Bars

	Soft Steel	*Base per Lb.*
F.o.b.	Pittsburgh	1.90c.
F.o.b.	Chicago	1.95c.
F.o.b.	Gary	1.95c.
F.o.b.	Duluth	2.10c.
Del'd	Detroit	2.05c.
F.o.b.	Cleveland	1.95c.
F.o.b.	Buffalo	2.00c.
Del'd	Philadelphia	2.19c.
Del'd	New York	2.23c
F.o.b.	Birmingham	2.05c.
F.o.b.	cars dock Gulf ports	2.30c.
F.o.b.	cars dock Pacific ports	2.45c.

Rail Steel
(For merchant trade)

F.o.b.	Pittsburgh	1.80c.
F.o.b.	Chicago	1.85c.
F.o.b.	Gary	1.85c.
F.o.b.	Moline, Ill.	1.85c.
F.o.b.	Cleveland	1.85c.
F.o.b.	Buffalo	1.90c.
F.o.b.	Birmingham	1.95c.
F.o.b.	cars dock Gulf ports	2.20c.
F.o.b.	cars dock Pacific ports	2.35c.

Billet Steel Reinforcing
(Straight lengths as quoted by distributers)

F.o.b.	Pittsburgh	2.05c.
F.o.b.	Chicago	2.10c.
F.o.b.	Gary	2.10c.
Del'd	Detroit	2.20c.
F.o.b.	Cleveland	2.10c.
F.o.b.	Youngstown	2.10c.
F.o.b.	Buffalo	2.10c.
F.o.b.	Birmingham	2.10c.
F.o.b.	cars dock Gulf ports	2.45c.
F.o.b.	cars dock Pacific ports	2.60c.

Rail Steel Reinforcing
(Straight lengths as quoted by distributers)

F.o.b.	Pittsburgh	1.90c.
F.o.b.	Chicago	1.95c.
F.o.b.	Gary	1.95c.
F.o.b.	Cleveland	1.95c.
F.o.b.	Youngstown	1.95c.
F.o.b.	Buffalo	1.95c.
F.o.b.	Birmingham	1.95c.
F.o.b.	cars dock Gulf ports	2.30c.
F.o.b.	cars dock Pacific ports	2.45c.

Iron

F.o.b.	Chicago	1.90c.
F.o.b.	Terre Haute, Ind.	1.85c.
F.o.b.	Reading, Pa.	
F.o.b.	Danville, Pa.	
F.o.b.	Berwick, Pa.	

Cold Finished Bars and Shafting*

		Base per Lb.
F.o.b.	Pittsburgh	2.10c.
F.o.b.	Chicago	2.15c.
F.o.b.	Gary	2.15c.
F.o.b.	Cleveland	2.15c.
F.o.b.	Buffalo	2.20c.
Del'd	Detroit	2.30c.
Del'd	eastern Michigan	2.35c.

* In quantities of 10,000 to 19,999 lb.

Fence and Sign Posts

Angle Line Posts

		Base per Net Ton
F.o.b.	Pittsburgh	$50.00
F.o.b.	Chicago	50.00
F.o.b.	Duluth	51.00
F.o.b.	Cleveland	50.00
F.o.b.	Birmingham	53.00
F.o.b.	Houston	59.00
F.o.b.	cars dock Pacific ports	67.00

Plates

		Base per Lb.
F.o.b.	Pittsburgh	1.85c.
F.o.b.	Chicago	1.90c.
F.o.b.	Gary	1.90c.
Del'd	Cleveland	2.035c.
F.o.b.	Coatesville	1.95c.
F.o.b.	Sparrows Points	1.95c.
Del'd	Philadelphia	2.035c.
Del'd	New York	2.13c.
F.o.b.	Birmingham	2.00c.
F.o.b.	cars dock Gulf ports	2.25c.
F.o.b.	cars dock Pacific ports	2.40c.
Wrought iron plates, f.o.b. P'gh		3.00c.

Floor Plates

F.o.b.	Pittsburgh	3.35c.
F.o.b.	Chicago	3.40c.
F.o.b.	Coatesville	3.45c.
F.o.b.	cars dock Gulf ports	3.75c.
F.o.b.	cars dock Pacific ports	3.90c.

Structural Shapes

		Base per Lb.
F.o.b.	Pittsburgh	1.85c.
F.o.b.	Chicago	1.90c.
Del'd	Cleveland	2.035c.
F.o.b.	Buffalo	1.95c.
F.o.b.	Bethlehem	1.95c.
Del'd	Philadelphia	2.055c.
Del'd	New York	2.1025c.
F.o.b.	Birmingham (standard)	2.00c.
F.o.b.	cars dock, Gulf ports	2.25c.
F.o.b.	cars dock Pacific ports	2.40c.

Steel Sheet Piling

		Base per Lb.
F.o.b.	Pittsburgh	2.15c.
F.o.b.	Chicago	2.25c.
F.o.b.	Buffalo	2.25c.
F.o.b.	cars dock Gulf ports	2.60c.
F.o.b.	cars dock Pacific ports	2.60c.

SHEETS, STRIP, TIN PLATE TERNE PLATE

Sheets

Hot Rolled

		Base per Lb.
No. 10, f.o.b.	Pittsburgh	2.00c.
No. 10, f.o.b.	Gary	2.10c.
No. 10, del'd	Detroit	2.20c.
No. 10, del'd	Phila	2.29c.
No. 10, f.o.b.	Birmingham	2.15c.
No. 10, f.o.b. dock cars Pacific ports		2.55c.

Hot-Rolled Annealed

No. 24, f.o.b.	Pittsburgh	2.65c.
No. 24, f.o.b.	Gary	2.75c.
No. 24, del'd	Detroit	2.85c.
No. 24, del'd	Phila.	2.94c.
No. 24, f.o.b.	Birmingham	2.80c.
No. 24, f.o.b. dock cars Pacific ports		3.25c.
No. 24, wrought iron, Pittsburgh		4.30c.

Heavy Cold-Rolled

No. 10 gage, f.o.b.	Pittsburgh	2.55c.
No. 10 gage, f.o.b.	Gary	2.65c.
No. 10 gage, del'd	Detroit	2.75c.
No. 10 gage, del'd	Phila.	2.84c.
No. 10 gage, f.o.b.	Birmingham	2.70c.
No. 10 gage, f.o.b. dock cars Pacific ports		3.15c.

Light Cold-Rolled

No. 20 gage, f.o.b.	Pittsburgh	3.15c.
No. 20 gage, f.o.b.	Gary	3.25c.
No. 20 gage, del'd	Detroit	3.35c.
No. 20 gage, del'd	Phila.	3.44c.
No. 20 gage, f.o.b.	Birmingham	3.30c.
No. 20 gage, f.o.b. dock cars Pacific ports		3.70c.

Galvanized Sheets

No. 24, f.o.b.	Pittsburgh	3.25c.
No. 24, f.o.b.	Gary	3.35c.
No. 24, del'd	Phila.	3.54c.
No. 24, f.o.b.	Birmingham	3.40c.
No. 24, f.o.b. dock cars Pacific ports		3.85c.
No. 24, wrought iron, Pittsburgh		4.95c.

Long Ternes

No. 24, unassorted 8-lb. coating f.o.b.	Pittsburgh	3.65c.
F.o.b. cars dock Pacific ports		4.35c.

Vitreous Enameling Stock

No. 20, f.o.b.	Pittsburgh	3.20c.

Tin Mill Black Plate

No. 28, f.o.b.	Pittsburgh	2.85c.
No. 28,	Gary	2.95c.
No. 28, cars dock, Pacific Coast ports		3.35c.

Tin Plate

	Base per Box
Standard cokes, f.o.b. P'gh district mill	$5.25
Standard cokes, f.o.b. Gary	5.35
Standard cokes, f.o.b. cars dock Pacific ports	5.90

Terne Plate

(F.o.b. Pittsburgh)

(Per Package, 20 x 28 in.)

8-lb.	coating I.C.	$10.00
15-lb.	coating I.C.	12.00
20-lb.	coating I.C.	13.00
25-lb.	coating I.C.	14.00
30-lb.	coating I.C.	15.25
40-lb.	coating I.C.	17.50

Hot-Rolled Hoops, Bands, Strips and Flats under ¼ In.

	Base per Lb.
All widths up to 24 in., P'gh	2.00c.
All widths up to 24 in., Chicago	2.10c.
All widths up to 24 in., del'd Detroit	2.20c.
All widths up to 24 in., Birmingham	2.15c.
Cooperage stock, Pittsburgh	2.10c.
Cooperage stock, Chicago	2.20c.

Cold-Rolled Strips

	Base per Lb.
F.o.b. Pittsburgh	2.80c.
F.o.b. Cleveland	2.80c.
Del'd Chicago	3.08c.
F.o.b. Worcester	3.00c.

Fender Stock

No. 16 and heavier, Pittsburgh or Cleveland	3.20c.
F.o.b. Worcester	3.60c.
No. 17 and lighter, Pittsburgh or Cleveland	3.50c.
F.o.b. Worcester	3.90c.

Hot-Rolled Rail Steel Strips

	Base per Lb.
F.o.b. Pittsburgh	1.80c.
F.o.b. Chicago	1.85c.

WIRE PRODUCTS

(Carload lots, f.o.b. Pittsburgh and Cleveland.)

	To Manufacturing Trade Per Lb.
Bright wire	2.30c.
Spring wire	3.20c.

To Jobbing Trade

Qualified jobbers are entitled to a reduction of 20c. a 100 lb. from the base price on carload shipments to stock, and of 10c. a 100 lb. on less-carload shipments to stock.

	Base per Keg
Standard wire nails	$2.60
Smooth coated nails	2.60
Galvanized nails:	
15 gage and coarser	4.60
16 gage and finer	5.10

	Base per 100 Lb.
Annealed fence wire	$2.45
Galvanized fence wire	2.80
Polished staples	3.30
Galvanized staples	3.55
Barbed wire, galvanized	3.00
Woven wire fence, base column	63.00

Chicago and Anderson, Ind., mill prices are $1 a ton over Pittsburgh base (on all products except woven wire fence, for which the Chicago price is $2 above Pittsburgh); Duluth, Minn., and Worcester, Mass., mill prices are $2 a ton over Pittsburgh (except for woven wire fence at Duluth which is $3 over Pittsburgh), and Birmingham mill prices are $3 a ton over Pittsburgh.

On manufacturers' wire prices at Houston and Galveston, Tex., and at Pacific ports are $9 above the Pittsburgh base. On high-carbon spring wire, prices at Pacific ports are also $9 above Pittsburgh. On wire nails, barbed wire, staples and fence wire, prices at Houston, Galveston and Corpus Christi are $6 a ton over Pittsburgh, while New Orleans and Pacific Coast prices are $8 over Pittsburgh. Exception: on fence wire Pacific Coast prices are $11 a ton above Pittsburgh.

Wire Hoops, Twisted or Welded

	Off List
F.o.b. Pittsburgh	35 and 2½ off
F.o.b. Chicago	35 off

Bale Ties, Single Loop

	Base per Net Ton
F.o.b. Pittsburgh	$63.00
F.o.b. Chicago	64.00
F.o.b. Duluth	65.00
F.o.b. Cleveland	63.00
F.o.b. Birmingham	66.00
F.o.b. cars dock Houston, Galveston, Beaumont, Orange or Corpus Christi, Tex.	72.00
F.o.b. cars dock Pacific ports	74.00

STEEL AND WROUGHT PIPE AND TUBING

Welded Pipe

Base Discounts, f.o.b. Pittsburgh District and Lorain, Ohio, Mills

F.o.b. Pittsburgh only on wrought iron pipe.

Butt Weld

Steel Inches	Black	Galv.	*Wrought Iron* Inches	Black	Galv.
⅛	51½	29½	⅛	+91½	+138
¼ to ⅜	53½	35	¼ & ⅜	+1½	+21½
½	58½	47	½	+31½	15
¾	62	52	¾	+36½	20½
1 to 3	64	55	1 & 1¼	39½	25½
			1½	+43½	28
			2	+41½	26

Lap Weld

2	60	51	2	37	22½
2½ to 3	63	54	2½ to 3½	38	25
3½ to 6	65	56	4 to 8	40	28½
7 and 8	64	54	9 to 12	38	24½
9 and 10	63½	53½			
11 and 12	62½	52½			

Butt Weld, extra strong, plain ends

⅛	48½	33½	⅛	+13	+45½
¼ to ⅜	51	38	¼ & ⅜	+2½	+34½
½	56½	47½	½	+32½	17½
¾	61	52	¾	+37½	22½
1 to 3	63	55	1 to 2	+43½	29

Lap Weld, extra strong, plain ends

2	58	50	2	40	26
2½ to 3	62	54	2½ to 4	45½	33
3½ to 6	65½	57½	4½ to 6	45	33½
7 and 8	64½	54½	7 & 8	46	33
9 and 10	63½	53½	9 to 12	41½	30
11 and 12	62½	52½			

On standard steel pipe an extra 5% off is allowed on sales to consumers while two 5's off apply on sales to jobbers. On less-than-carload shipments prices are determined by adding 20 and 25% and the carload freight rate to the base card. On structural steel pipe the base card is reduced 2 points and two 5's off are allowed to consumers and three 5's off to jobbers.

Note—Chicago district mills have a base two points less than the above discounts. Chicago delivered base is 2½ points less. Freight is figured from Pittsburgh, Lorain, Ohio, and Chicago district mills, the billing being from the point producing the lowest price to destination.

Boiler Tubes

Note: New prices on lap weld steel boiler tubes are shown on page 65.

Seamless Steel Commercial Boiler Tubes and Locomotive Tubes

(Net base prices per 100 ft. f.o.b. Pittsburgh, in carload lots)

			Cold Drawn	Hot Rolled
1 in. o.d.	13	B.W.G.	$ 8.60	...
1¼ in. o.d.	13	B.W.G.	10.19	...
1½ in. o.d.	13	B.W.G.	11.26	...
1¾ in. o.d.	13	B.W.G.	12.81	...
2 in. o.d.	13	B.W.G.	14.35	$13.0
2¼ in. o.d.	13	B.W.G.	16.00	14.5
2½ in. o.d.	12	B.W.G.	19.29	17.5
2¾ in. o.d.	12	B.W.G.	20.45	18.5
3 in. o.d.	12	B.W.G.	21.45	19.5
3¼ in. o.d.	11	B.W.G.	25.22	22.9
3½ in. o.d.	11	B.W.G.	27.09	24.6
4 in. o.d.	10	B.W.G.	33.60	30.5
4½ in. o.d.	10	B.W.G.	41.08	37.3
5 in. o.d.	9	B.W.G.	51.56	46.9
6 in. o.d.	7	B.W.G.	79.15	71.9

Extras for less-carload quantities:
25,000 lb. or ft. to 39,999 lb. or ft. 5
10,000 lb. or ft. to 24,999 lb. or ft. 12½
2,000 lb. or ft. to 9,999 lb. or ft. 25
Under 2,000 lb. or ft. 40

CAST IRON WATER PIPE

	Per Net Ton
6-in. and larger, del'd Chicago	$44.00 to $45.0
4-in., del'd Chicago	47.00 to 48.0
6-in. and larger, del'd New York	43.0
4-in. del'd New York	46.0
6-in., and larger, Birmingham,	36.00 to 37.0
4-in. Birmingham	39.00 to 40.0

Class "A" and gas pipe, $3 extra

RAILROAD MATERIALS

Rails and Track Supplies

F.o.b. Mill

Standard rails, heavier than 60 lb., per gross ton	$36.37½
Angle bars, per 100 lb.	2.35

F.o.b. Code Basing Points

Light rails (from billets) per gross ton	$35.0
Light rails (from rail steel) per gross ton	34.0

	Base per 100 Lb.
Spikes, 9/16 in. and larger	$2.9
Spikes, ½ in. and smaller	2.8
Spikes, boat and barge	2.9
Tie plates, steel	1.9
Track bolts, to steam railroads	3.7
Track bolts, no jobbers, all sizes (per 100 count)	70 per cent off

Basing points on light rails are Pittsburgh, Chicago and Birmingham; on spikes and tie plates, Pittsburgh, Chicago, Buffalo, Portsmouth, Ohio, Weirton, W. Va., St. Louis, Kansas City, Minnesota, Colo., Birmingham and Pacific Coast ports; on tie plates alone, Steelton, Pa.; on spikes alone, Cleveland, Youngstown, Lebanon, Pa., Columbia, Pa., Richmond, Va., Jersey City, N. J.

Girder Rails

	Per Gross Ton
F.o.b. Lorain	$47.0
F.o.b. Steelton	47.0

Splice Bars for Girder Rails

	Base per 100 Lb.
F.o.b. Lorain and Steelton	$4.0

Steel Car Axles

	Base per Lb.
F.o.b. Pittsburgh	2.65c.
F.o.b. Chicago	2.65c.
F.o.b. Birmingham	2.65c.

BOLTS, NUTS, RIVETS AND SET SCREWS

Bolts and Nuts

(F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)

	Per Cent Off List
Machine bolts	70
Carriage bolts	70
Lag bolts	70
Plow bolts, Nos. 1, 2, 3 and 7 heads	70
Hot-pressed nuts, blank or tapped, square	70
Hot-pressed nuts, blank or tapped, hexagons	70
C.p.c. and t. square or hex. nuts, blank or tapped	70
Semi-finished hexagon nuts	70
Semi-finished hexagon castellated nuts, S.A.E.	70
Stove bolts in packages, Pittsburgh	75
Stove bolts in packages, Chicago	75
Stove bolts in packages, Cleveland	75
Stove bolts in bulk, P'gh	83
Stove bolts in bulk, Chicago	83
Stove bolts in bulk, Cleveland	83
Tire bolts	60

Large Rivets

(½-in. and larger)

	Base per 100 Lb.
F.o.b. Pittsburgh or Cleveland	$3.00
F.o.b. Chicago	3.10
F.o.b. Birmingham	3.15

Small Rivets

(7/16-in. and smaller)

	Per Cent Off List
F.o.b. Pittsburgh	70 and 5
F.o.b. Cleveland	70 and 5
F.o.b. Chicago and Birm'g'm	70 and 5

Cap and Set Screws

(Freight allowed up to but not exceeding 65c. per 100 lb. on lots of 200 lb. or more)

	Per Cent Off List
Milled cap screws, 1 in. dia. and smaller	75, 10 and 10
Milled standard set screws, case hardened, 1 in. dia. and smaller	75 and 10
Milled headless set screws, cut thread ⅜ in. and smaller	75
Upset hex. head cap screws, U.S.S.S. or S.A.E. thread, 1 in. dia. and smaller	85
Upset set screws, cut and oval point	75 and 10
Milled studs	65

Alloy and Stainless Steel

Alloy Steel Ingots

F.o.b. Pittsburgh, Chicago, Canton, Massillon, Buffalo, Bethlehem.
Uncropped .....$42 per gross ton

Alloy Steel Blooms, Billets and Slabs

F.o.b. Pittsburgh, Chicago, Canton, Massillon, Buffalo, Bethlehem.
Base price, $51 a gross ton.
Price del'd Detroit is $54.

Alloy Steel Bars

F.o.b. Pittsburgh, Chicago, Buffalo, Bethlehem, Massillon or Canton.
Open-hearth grade, base.....2.55c. a lb.
Delivered price at Detroit is 2.70c.

S.A.E. Series Numbers	Alloy Differential per 100 lb.
2000 (½% Nickel)	$0.25
2100 (2½% Nickel)	0.55
2300 (3½% Nickel)	1.50
2500 (5% Nickel)	2.25
3100 Nickel Chromium	0.55
3200 Nickel Chromium	1.35
3300 Nickel Chromium	3.80
3400 Nickel Chromium	3.20
4100 Chromium Molybdenum (0.15 to 0.25 Molybdenum)	0.50
4100 Chromium Molybdenum (0.25 to 0.40 Molybdenum)	0.70
4600 Nickel Molybdenum (0.20 to 0.30 Molybdenum) (1.50 to 2.00 Nickel)	1.05
5100 Chromium Steel (0.60 to 0.90 Chromium)	0.35
5100 Chromium Steel (0.80 to 1.10 Chromium)	0.45
5100 Chromium Spring Steel	base
6100 Chromium Vanadium Bar	1.20
4100 Chromium Vanadium Spring Steel	0.95
Chromium Nickel Vanadium	1.50
Carbon Vanadium	0.95

These prices are for hot-rolled steel bars. The differential for most grades in electric furnace steel is 50c. higher. The differential for cold-drawn bars is ½c. per lb. higher with separate extras. Blooms, billets and slabs under 4x4 in. or equivalent are sold on the bar base. Slabs with a section area of 16 in. and 2½ in. thick or over take the billet base. Sections 4x4 in. to 10x10 in. or equivalent carry a gross ton price, which is the net price for bars for the same analysis. Larger sizes carry extras.

Alloy Cold-Finished Bars

F.o.b. Pittsburgh, Chicago, Garv, Cleveland or Buffalo, 3.05c. base per lb.

STAINLESS STEEL No. 302

(17 to 19% Cr, 7 to 9% Ni, 0.08 to 0.20% C)
(Base Prices, f.o.b. Pittsburgh)

	Per Lb.
Bars	23c.
Plates	26c.
Sheets	33c.
Hot-rolled strip	20¾c.
Cold-rolled strip	27c.

Raw and Semi-Finished Steel

Carbon Steel Rerolling Ingots

F.o.b. Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham.
Uncropped .....$29 per gross ton

Carbon Steel Forging Ingots

F.o.b. Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Birmingham.
Uncropped .....$31 per gross ton

Billets, Blooms and Slabs

F.o.b. Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham.

	Per Gross Ton
Rerolling	$29.00
Forging quality	34.00
Delivered Detroit	
Rerolling	$32.00
Forging quality	37.00
Billets Only F.o.b. Duluth	
Rerolling	$32.00
Forging	37.00

Sheet Bars

F.o.b. Pittsburgh, Chicago, Cleveland, Youngstown, Buffalo, Canton, Sparrows Point, Md.

	Per Gross Ton
Open-hearth or Bessemer	$30.00

Skelp

F.o.b. Pittsburgh, Chicago, Youngstown, Buffalo, Coatesville, Pa., Sparrows Point, Md.

	Per Lb.
Grooved	1.70c.
Universal	1.70c.
Sheared	1.70c.

Tube Rounds

	Base per Lb.
F.o.b. Pittsburgh	1.90c.
F.o.b. Chicago	1.95c.
F.o.b. Cleveland	1.95c.
F.o.b. Birmingham	2.05c.

Wire Rods

(Common soft, base)

	Per Gross Ton
F.o.b. Pittsburgh	$38.00
F.o.b. Cleveland	38.00
F.o.b. Chicago	39.00
F.o.b. Anderson, Ind.	39.00
F.o.b. Youngstown	39.00
F.o.b. Worcester, Mass.	40.00
F.o.b. Birmingham	41.00
F.o.b. San Francisco	47.00

Pig Iron and Ferroalloys

PIG IRON

PRICES PER GROSS TON AT BASING POINTS

Basing Points	No. 2 Fdry.	Malleable	Basic	Bessemer
Everett, Mass.	$19.50	$20.00	$19.00	$20.50
Bethlehem, Pa.	19.50	20.00	19.00	20.50
Birdsboro, Pa.	19.50	20.00	19.00	20.50
Swedeland, Pa.	19.50	20.00	19.00	20.50
Sparrows Point, Md.	19.50	....	19.00	....
Neville Island, Pa.	18.50	18.50	18.00	19.00
Sharpsville, Pa.	18.50	18.50	18.00	19.00
Youngstown	18.50	18.50	18.00	19.00
Buffalo	18.50	19.00	17.50	19.50
Erie, Pa.	18.50	19.00	18.00	19.50
Cleveland	18.50	18.50	18.00	19.00
Toledo, Ohio	18.50	18.50	18.00	19.00
Jackson, Ohio	20.25	20.25	19.75	....
Detroit	18.50	18.50	18.00	19.00
Hamilton, Ohio	18.50	18.50	18.00	....
Chicago	18.50	18.50	18.00	19.00
Granite City, Ill.	18.50	18.50	18.00	....
Duluth, Minn.	19.00	19.00	....	19.50
Birmingham	14.50	14.50	13.50	19.00
Provo, Utah	17.50	....	17.00	....

DELIVERED PRICES PER GROSS TON AT CONSUMING CENTERS

	No. 2 Fdry.	Malleable	Basic	Bessemer
Boston Switching District				
From Everett, Mass.	$20.00	$20.50	$19.50	$21.00
Brooklyn				
From East Pa. or Buffalo	21.77	22.27	21.27	22.77
Newark or Jersey City, N. J.				
From East. Pa. or Buffalo	20.89	21.39	20.39	21.89
Philadelphia				
From Eastern Pa.	20.26	20.76	19.76	21.26
Cincinnati				
From Hamilton, Ohio	19.51	19.51	19.01	21.65
Canton, Ohio				
From Cleveland and Youngstown	19.76	19.76	19.26	20.26
Columbus, Ohio				
From Hamilton, Ohio	20.50	20.50	....	....
Mansfield, Ohio				
From Cleveland and Toledo	20.26	20.26	....	....
Indianapolis				
From Hamilton, Ohio	20.77	20.77	....	....
South Bend, Ind.				
From Chicago	20.55	20.55	....	....
Milwaukee				
From Chicago	19.50	19.50	....	....
St. Paul				
From Duluth	20.94	....	....	....
Davenport, Iowa				
From Chicago	20.26	20.26	....	....
Kansas City				
From Granite City	21.04	21.04	....	....

Delivered prices on Southern iron for shipment to Northern points are 38c. a gross ton below delivered prices from the nearest Northern basing points.

LOW PHOSPHORUS PIG IRON

Basing points: Birdsboro, Pa., Steelton, Pa., and Standish, N. Y. $23.50
Johnson City, Tenn. 19.50
Del'd Chicago 25.15

GRAY FORGE PIG IRON

Valley furnace $18.25

CHARCOAL PIG IRON

Lake Superior furnace $21.00
Delivered Chicago 24.04
Delivered Buffalo 24.28

CANADA

Pig Iron

Per gross ton:

Delivered Toronto	
No. 1 fdy., sil. 2.25 to 2.75	$21.00
No. 2 fdy., sil. 1.75 to 2.75	20.50
Malleable	21.00

Delivered Montreal	
No. 1 fdy., sil. 2.25 to 2.75	$22.50
No. 2 fdy., sil. 1.75 to 2.25	22.00
Malleable	22.50
Basic	22.00

FERROALLOYS

Ferromanganese

F.o.b. New York, Philadelphia, Baltimore, Mobile or New Orleans.

	Per Gross Ton
Domestic, 80% (carload)	$85.00

Spiegeleisen

	Per Gross Ton Furnace
Domestic, 19 to 21%	$26.00

Electric Ferrosilicon

	Per Gross Ton Delivered
50% (carloads)	$77.50
50% (ton lots)	85.00
75% (carloads)	126.00
75% (ton lots)	136.00
14% to 16% (f.o.b.) Welland, Ont. (in carloads) (duty paid)	31.00
14% to 16% (less carloads)	38.50

Silvery Iron

F.o.b. Jackson, Ohio, Furnace

Per Gross Ton		*Per Gross Ton*	
6%	$22.75	12%	$29.25
7%	23.75	13%	30.75
8%	24.75	14%	32.25
9%	25.75	15%	33.75
10%	26.75	16%	35.25
11%	27.75	17%	36.75

Base prices at Buffalo are $1.25 higher than at Jackson except on 17 to 18% in which the Buffalo price is $1.75 a ton higher.

Bessemer Ferrosilicon

F.o.b. Jackson, Ohio, Furnace

Per Gross Ton		*Per Gross Ton*	
10%	$27.75	14%	$33.25
11%	28.75	15%	34.75
12%	30.25	16%	36.25
13%	31.75	17%	37.75

Manganese 1½ to 3%, $1 a ton additional. For each unit of manganese over 3%, $1 a ton additional. Phosphorus 0.75% or over, $1 ton additional.

Base prices at Buffalo are $1.25 a ton higher than at Jackson.

Other Ferroalloys

Ferrotungsten, per lb. contained W, del., carloads	$1.40 to $1.50
Ferrotungsten, less carloads	1.55 to 1.60
Ferrochromium, 4 to 6% carbon and up, 65 to 70% Cr. per lb. contained Cr. delivered, in carloads	10.00c.
Ferrochromium, 2% carbon	16.50c. to 17.00c.
Ferrochromium, 1% carbon	17.50c. to 18.00c.
Ferrochromium, 0.10% carbon	19.50c. to 20.00c.
Ferrochromium, 0.06% carbon	20.00c. to 20.50c.
Ferrovanadium, del., per lb. contained V	$2.70 to $2.90
Ferrocarbontitanium, 15 to 18% Ti, 6 to 8% C, f.o.b. furnace carload and contract per net ton	$137.50
Ferrophosphorus, electric, or blast furnace material, in carloads, 18%, Rockdale, Tenn., base, per gross ton with $2 unitage	50.00
Ferrophosphorus, electric, 24% f.o.b. Anniston, Ala., per gross ton with $2.75 unitage	65.00
Ferromolybdenum, per lb. Mo., del.	95c.
Calcium molybdate, per lb. Mo., del.	80c.
Silico spiegel, per ton, f.o.b. furnace, car lots	$38.00
Ton lots or less, per ton	45.50
Silico-manganese, gross ton, delivered:	
2.50% carbon grade	90.00
2% carbon grade	95.00
1% carbon grade	105.00
Spot prices	$5 a ton higher

Iron and Steel Scrap

PITTSBURGH

Per gross ton delivered consumers' yards:	
No. 1 heavy melting steel	$11.50 to $12.00
No. 2 heavy melting steel	10.50 to 11.00
No. 2 railroad wrought	11.50 to 12.00
Scrap rails	11.50 to 12.00
Rails 3 ft. and under	14.50 to 15.00
Compressed sheet steel	11.00 to 11.50
Hand bundled sheet steel	10.00 to 10.50
Hvy. steel axle turnings	11.00 to 11.50
Machine shop turnings	7.00 to 7.50
Short shov. turnings	7.00 to 7.50
Short mixed borings and turnings	7.00 to 7.50
Cast iron borings	7.00 to 7.50
Cast iron carwheels	11.50 to 12.00
Heavy breakable cast	10.00 to 10.50
No. 1 cast	12.00 to 12.50
Railr. knuckles and couplers	13.50 to 14.00
Rail, coil and leaf springs	13.50 to 14.00
Rolled steel wheels	13.50 to 14.00
Low phos. billet crops	15.00 to 15.50
Low phos. sheet bar crops	14.50 to 15.00
Low phos. plate scrap	13.50 to 14.00
Low phos. punchings	14.00 to 14.50
Steel car axles	14.50 to 15.00

CHICAGO

Delivered Chicago district consumers: *Per Gross Ton*	
Heavy melting steel	$9.50 to $10.00
Automobile hvy. melt. steel	8.75 to 9.25
Shoveling steel	$9.50 to $10.00
Hydraulic comp. sheets	8.50 to 9.00
Drop forge flashings	7.50 to 8.00
No. 1 busheling	8.00 to 8.50
Rolled carwheels	10.25 to 10.75
Railroad tires	10.25 to 10.75
Railroad leaf springs	10.25 to 10.75
Axle turnings	8.00 to 8.50
Steel couplers and knuckles	10.00 to 10.50
Coil springs	10.25 to 10.75
Axle turnings (elec. fur.)	8.50 to 9.00
Low phos. punchings	10.50 to 11.00
Low phos. plates, 12 in. and under	10.50 to 11.00
Cast iron punchings	5.00 to 5.50
Short shoveling turnings	5.00 to 5.50
Machine shop turnings	5.00 to 5.50
Rerolling rails	10.50 to 11.00
Steel rails, less than 3 ft.	10.50 to 11.00
Steel rails, less than 2 ft.	11.00 to 11.50
Angle bars, steel	10.25 to 10.75
Cast iron carwheels	9.75 to 10.25
Railroad malleable	9.75 to 10.25
Agricultural malleable	8.00 to 8.50

Per Net Ton	
Iron car axles	$11.25 to $11.75
Steel car axles	10.50 to 11.00
No. 1 railroad wrought	7.50 to 8.00
No. 2 railroad wrought	8.25 to 8.75
No. 2 busheling	2.75 to 3.25
Locomotive tires, smooth	8.50 to 9.00
Pipe and flues	4.00 to 4.50
No. 1 machinery cast	7.50 to 8.00
Clean automobile cast	7.50 to 8.00
No. 1 railroad cast	7.00 to 7.50
No. 1 agricultural cast	6.00 to 6.50
Stove plate	5.50 to 6.00
Grate bars	5.00 to 5.50
Brake shoes	6.50 to 7.00

PHILADELPHIA

Per gross ton delivered consumers' yards:	
No. 1 heavy melting steel	$10.50
No. 2 heavy melting steel	$8.50 to 9.00
No. 1 railroad wrought	12.00 to 12.50
Bundled sheets	9.50
Hydraulic compressed, new	10.00
Hydraulic compressed, old	7.00
Machine shop turnings	6.50 to 7.00
Heavy axle turnings	9.00 to 9.50
Cast borings	5.50 to 6.00
Heavy breakable cast	10.50 to 10.75
Stove plate (steel works)	8.00 to 8.50
No. 1 low phos. heavy	15.00
Couplers and knuckles	14.00 to 14.50
Rolled steel wheels	14.00 to 14.50
No. 1 blast furnace	5.50 to 6.00
Spec. iron and steel pipe	9.00
Shafting	15.00 to 16.00
Steel axles	14.50
No. 1 forge fire	9.50 to 10.00
Cast iron car wheels	11.00 to 11.50
No. 1 cast	12.00 to 12.50
Cast borings (chem.)	12.00 to 14.00
Steel rails for rolling	13.00

CINCINNATI

Dealers' buying prices per gross ton:	
Heavy melting steel	$7.25 to $7.75
Scrap rails for melting	8.25 to 8.75
Loose sheet clippings	3.75 to 4.25
Bundled sheets	5.75 to 6.25
Cast iron borings	5.00 to 5.50
Machine shop turnings	4.75 to 5.25
No. 1 busheling	6.25 to 6.75
No. 2 busheling	2.75 to 3.25
Rails for rolling	8.75 to 9.25
No. 1 locomotive tires	8.50 to 9.00
Short rails	11.25 to 11.75
Cast iron carwheels	7.75 to 8.25
No. 1 machinery cast	9.00 to 9.50
No. 1 railroad cast	8.50 to 9.00
Burnt cast	6.00 to 6.50
Stove plate	6.00 to 6.50
Agricultural malleable	8.00 to 8.50
Railroad malleable	8.00 to 8.50

CLEVELAND

Per gross ton delivered consumers' yards:	
No. 1 heavy melting steel	$9.25 to $9.75
No. 2 heavy melting steel	8.75 to 9.25
Compressed sheet steel	8.75 to 9.25
Light bundled sheet stampings	7.25 to 7.50
Drop forge flashings	8.75 to 9.25
Machine shop turnings	7.25 to 7.50
Short shoveling turnings	7.25 to 7.50
No. 1 busheling	8.75 to 9.25
Steel axle turnings	8.25 to 8.75
Low phos. billet crops	13.25 to 13.75
Cast iron borings	7.25 to 7.50
Mixed borings and short turnings	7.25 to 7.50
No. 2 busheling	7.25 to 7.50
No. 1 cast	11.50 to 11.75
Railroad grate bars	7.00 to 7.50
Stove plate	6.50 to 7.00
Rails under 3 ft.	14.50 to 15.00
Rails for rolling	16.00 to 16.50
Railroad malleable	11.50 to 12.00
Cast iron carwheels	10.75 to 11.25

BUFFALO

Per gross ton, f.o.b. Buffalo consumers' plants:	
No. 1 heavy melting steel	$11.50 to $12.00
No. 2 heavy melting scrap	10.00 to 10.50
Scrap rails	11.00 to 11.50
New hydraul. comp. sheets	10.00 to 10.50
Old hydraul. comp. sheets	9.00 to 9.50
Drop forge flashings	10.00 to 10.50
No. 1 busheling	10.00 to 10.50
Hvy. steel axle turnings	8.00 to 8.50
Machine shop turnings	5.00 to 5.50
Knuckles and couplers	12.00 to 12.50
Coil and leaf springs	12.00 to 12.50
Rolled steel wheels	12.00 to 12.50
Low phos. billet crops	12.50 to 13.00
Short shov. steel turnings	6.50 to 7.00
Short mixed borings and turnings	6.50 to 7.00
Cast iron borings	6.50 to 7.00
No. 2 busheling	6.50 to 7.00
Steel car axles	12.00 to 12.50
Iron axles	12.00 to 12.50
No. 1 machinery cast	11.50 to 12.00
No. 1 cupola cast	9.50 to 10.00
Stove plate	9.50 to 9.75
Steel rails, 3 ft. and under	13.50 to 14.00
Cast iron carwheels	11.50 to 12.00
Industrial malleable	11.50 to 12.00
Railroad malleable	11.50 to 12.00
Chemical borings	8.50 to 9.00

BOSTON

Dealers' buying prices per gross ton:	
No. 1 heavy melting steel	$5.50 to $6.00
Scrap T rails	5.50 to 6.00
No. 2 steel	4.75 to 5.00
Breakable cast	6.00 to 6.50
Machine shop turnings	1.50 to 1.55
Bundled skeleton, long	3.75 to 4.00
Forge flashings	3.75 to 4.00
Blast furnace scrap	2.00 to 2.50
Shafting	11.00 to 11.25
Steel car axles	10.50 to 11.00
Wrought pipe	5.00 to 5.25
Cast iron borings, chemical	8.00 to 8.25
Stove plate	6.50
Per gross ton delivered consumers' yards:	
Textile cast	$7.50 to $9.00
No. 1 machinery cast	7.50 to 9.00
Railroad malleable	11.00 to 11.50

NEW YORK

Dealers' buying prices per gross ton:	
No. 1 heavy melting steel	†$8.00
No. 2 heavy melting steel	†6.50
Heavy breakable cast	$7.00 to 7.50
No. 1 machinery cast	8.00
No. 2 cast	6.25 to 6.75
Stove plate	5.50
Steel car axles	10.75 to 11.50
No. 1 railroad wrought	7.50 to 8.00
No. 1 yard wrought, long	6.50 to 7.00
Spec. iron and steel pipe	4.50 to 5.00
Forge fire	5.50 to 6.00
Rails for rerolling	9.50 to 10.00
Short shoveling turnings	3.00 to 4.00
Machine shop turnings	3.00 to 3.50
Cast borings	4.50 to 4.75
No. 1 blast furnace	2.00 to 2.50
Cast borings (chemical)	11.00 to 11.50
Unprepared yard iron and steel	4.00
Per gross ton, delivered local foundries:	
No. machinery cast	$10.75
No. 1 hvy. cast (cupola size)	9.75
No. 2 cast	8.25

†Loading on barge.

BIRMINGHAM

Per gross ton delivered consumers' yards:	
Heavy melting steel	$10.00
Scrap steel rails	9.00
Short shoveling turnings	5.50
Stove plates	$7.00 to 7.50
Steel axles	10.50 to 11.00
Iron axles	10.50 to 11.00
No. 1 railroad wrought	7.00
Rails for rolling	10.50
No. 1 cast	9.00 to 9.50
Tramcar wheels	9.00 to 9.50
Cast iron borings, chem.	8.00

ST. LOUIS

Per gross ton delivered consumers' yards:	
Selected heavy steel	$8.75 to $9.25
No. 1 heavy melting	8.50 to 9.00
No. 2 heavy melting	7.00 to 7.50
No. 1 locomotive tires	9.50 to 10.00
Misc. stand-sec. rails	8.75 to 9.25
Railroad springs	10.25 to 10.75
Bundled sheets	6.75 to 7.25
No. 2 railroad wrought	8.00 to 8.50
No. 1 busheling	5.00 to 5.50
Cast iron borings and shoveling turnings	4.75 to 5.25
Rails for rolling	9.75 to 10.25
Machine shop turnings	4.50 to 5.00
Heavy turnings	5.50 to 6.00
Steel car axles	10.50 to 11.00
Iron car axles	13.00 to 13.50
No. 1 railroad wrought	5.50 to 6.00
Steel rails less than 3 ft.	10.75 to 11.25
Steel angle bars	9.00 to 9.50
Cast iron carwheels	8.00 to 8.50
No. 1 machinery cast	9.00 to 9.50
Railroad malleable	9.00 to 9.50
No. 1 railroad cast	8.50 to 9.00
Stove plate	6.50 to 7.00
Agricult. malleable	9.00 to 9.50

DETROIT

Dealers' buying prices per gross ton:	
Heavy melting steel	$7.00 to $7.50
Borings and short turnings	5.00 to 5.50
Long turnings	$4.00 to $4.50
No. 1 machinery cast	9.00 to 9.50
Automotive cast	10.00 to 10.50
Hydraul. comp. sheets	7.00 to 7.50
Stove plate	6.50 to 7.00
New factory busheling	6.00 to 6.50
Old No. 2 busheling	4.25 to 4.75
Sheet clippings	3.50 to 4.00
Flashings	6.00 to 6.50
Low phos. plate scrap	7.50 to 8.00

CANADA

Dealers' buying prices per gross ton:		
	Toronto	Montreal
Heavy melting steel	$5.50	$5.50
Rails scrap	6.00	4.50
Machine shop turnings	2.50	2.50
Roller plate	4.50	4.50
Heavy axle turnings	2.50	2.50
Cast borings	3.00	3.00
Steel borings	2.00	2.00
Wrought pipe	2.50	2.50
Steel axles	4.50	6.00
Axles wrought iron	4.50	6.50
No. 1 machinery cast	7.75	9.00
Stove plate	4.50	5.00
Standard carwheels	7.25	7.00
Malleable	6.75	7.00

ORES, FLUORSPAR, COKE, FUEL, REFRACTORIES

Lake Superior Ores

Delivered Lower Lake Ports

Per Gross Ton	
Old range, Bessemer, 51.5% iron	$4.80
Old range, non-Bessemer, 51.50% iron	4.65
Mesabi, Bessemer, 51.50% iron	4.65
Mesabi, non-Bessemer, 51.50% iron	4.50
High phosphorus, 51.50% iron	4.40

Foreign Ore

C.i.f. Philadelphia or Baltimore

Per Unit	
Iron, low phos., copper free, 55 to 58% iron, dry Spanish or Algerian	9.50c
Iron, low phos., Swedish, average 68½% iron	9.50c.
Iron, basic or foundry, Swedish, average, 65% iron	9c
Iron, basic or foundry, Russian, aver. 65% iron	9c
Manganese, Caucasian, washed 52%	24c
Manganese, African, Indian, 44-48%	21c
Manganese, African, Indian, 49-51%	24c
Manganese, Brazilian, 46 to 48½	20c

Per Net Ton Unit	
Tungsten, Chinese, wolframite, duty paid, delivered*	$18.75 to $19.25
Tungsten, domestic scheelite, delivered†	17.00

Per Gross Ton	
Chrome, 45%, Cr_2O_3, crude, c.i.f. Atlantic Seaboard	$17.00
Chrome, 48% Cr_2O_3, c.i.f. Atlantic Seaboard	20.00

*Quotations nominal in absence of sales
†Nominal; no supplies available.

Fluorspar

Per Net Ton	
Domestic, washed gravel, 85-5 f.o.b. Kentucky and Illinois mines for all-rail shipment	$17.00
Same grade for Ohio River barge shipment for Kentucky and Illinois River landings	18.50
No. 2 lump, 85-5, f.o.b. Kentucky and Illinois mines	$17.50 to 18.00
Foreign, 85% calcium fluoride, not over 5% silicon, c.i.f. Atlantic port, duty paid	19.00
Domestic, No. 1 ground bulk, 95 to 98% calcium fluoride, not over 2½% silicon, f.o.b. Illinois and Kentucky mines	30.00

COKE, COAL AND FUEL OIL

Coke

Per Net Ton	
Furnace, f.o.b. Connellsville Prompt	$3.85
Furnace, f.o.b. Connellsville Prompt	$4.60 to 5.60
Foundry, by-product, Chicago ovens, for delivery outside switching district	8.50
Foundry, by-product, delivered in Chicago switching district	9.25
Foundry, by-product, New England, delivered	11.00
Foundry, by-product, Newark or Jersey City, del'd	8.20 to 8.81
Foundry, by-product, Phila.	9.00
Foundry, by-product, Cleveland, delivered	$9.25
Foundry, Birmingham	6.00
Foundry, by-product, St. Louis, f.o.b. ovens	8.00
Foundry, by-product, del'd St. Louis	9.00

Coal

Per Net Ton	
Mine run steam coal, f.o.b. W. Pa. mines	$1.80 to $2.05
Mine run coking coal f.o.b. W. Pa.	2.05 to 2.25
Gas coal, ¾-in. f.o.b. Pa. mines	2.25 to 2.55
Mine run gas coal, f.o.b. Pa. mines	2.05 to 2.45
Steam slack, f.o.b. W. Pa. mines	1.55 to 1.65
Gas slack, f.o.b. W. Pa. mines	1.90 to 2.10

Fuel Oil

Per Gal. f.o.b. Bayonne, N. J.	
No. 3 distillate	4.00c.
No. 4 industrial	3.50c.

Per Gal. f.o.b. Baltimore	
No. 3 distillate	4.00c.
No. 4 industrial	3.50c.

Per Gal. del'd Chicago	
No. 3 industrial fuel oil	3.73c.
No. 5 industrial fuel oil	3.00c.

Per Gal. f.o.b. Cleveland	
No. 3 distillate	5.75c.
No. 4 industrial	5.50c.
No. 5 industrial	4.75c.

REFRACTORIES

Fire Clay Brick

	Per 1000 f.o.b. Works High-heat Duty Brick	Intermediate Duty Brick
Pennsylvania	$45.00	$40.00
Maryland	45.00	40.00
New Jersey	55.00	43.00
Ohio	45.00	40.00
Kentucky	45.00	40.00
Missouri	45.00	40.00
Illinois	45.00	40.00
Ground fire clay, per ton	7.00	

Chrome Brick

Per Net Ton	
Standard size	$45.00

Silica Brick

Per 1000 f.o.b. Works	
Pennsylvania	$45.00
Chicago	54.00
Birmingham	55.00
Silica clay, per ton	8.00

Magnesite Brick

Per Net Ton	
Standard sizes, burned, f.o.b Baltimore and Chester, Pa.	$65.00
Unburned, f.o.b. Baltimore	55.00
Grain magnesite, f.o.b. Baltimore and Chester, Pa.	40.00
Domestic, f.o.b. Chewelah, Wash.	22.00

Warehouse Prices for Steel Products

PITTSBURGH

	Base per Lb.
Plates	3.20c.
Structural shapes	3.20c.
Soft steel bars and small shapes	3.00c.
Reinforcing steel bars	3.00c.
Cold-finished and screw stock—	
Rounds and hexagons	*3.45c.
Squares and flats	*3.45c.
Hoops and bands under ¼ in.	3.35c.
Hot-rolled annealed sheets (No. 24), 25 or more bundles	3.35c.
Galv. sheets (No. 24), 25 or more bundles	4.10c.
Hot-rolled sheets (No. 10)	3.10c.
Galv. corrug. sheets (No. 28), per square (more than 3750 lb.)	$3.32
Spikes, large	2.90c.
Track bolts, all sizes, per 100 count,	65 per cent off list.
Machine bolts, 100 count,	65 per cent off list.
Carriage bolts, 100 counts,	65 per cent off list.
Nuts, all styles, 100 count,	65 per cent off list.
Large rivets, base per 100 lb.	$3.50
Wire, black, soft ann'l'd, base per 100 lb.	*2.70c.
Wire, galv. soft, base per 100 lb.	*2.925c.
Common wire nails, per keg	*2.834c.
Cement coated nails, per keg	*2.834c.

On plates, structurals, bars, reinforcing bars, bands, hoops and blue annealed sheets, base applied to orders of 400 to 1999 lb.

*Delivered in Pittsburgh switching district.

CHICAGO

	Base per Lb.
Plates and structural shapes	3.10c.
Soft steel bars	2.90c.
Cold-fin. steel bars and shafting	
Rounds and hexagons	3.50c.
Flates and squares	3.50c.
Bands, 3/16 in. (in Nos. 10 and 12 gages)	3.30c.
Hoops (No. 14 gage and lighter)	3.20c.
Hot-rolled annealed sheets (No. 24)	3.85c.
Galv. sheets (No. 24)	4.45c.
Hot-rolled sheets (No. 10)	2.85c.
Spikes (9/16 in. and lighter)	3.50c.
Track bolts	4.65c.
Rivets, structural (keg lots)	3.50c.
Rivets, boiler (keg lots)	3.60c.
	Per Cent Off List
Machine bolts	60 and 5
Carriage bolts	60 and 5
Coach and lag screws	60 and 5
Hot-pressed nuts, sq. tap. or blank	60 and 5
Hot-pressed nuts, hex. tap or blank	60 and 5
Hex. head and cap screws	80
Cup point set screws	70
Flat head bright wood screws	37½ and 10
Spring cotters	50
Store bolts in full packages	70 and 10
Bd. hd. tank rivets, 7/16 in. and smaller	57½
Wrought washers	$5.50 off list
No. 8 black ann'l'd wire per 100 lb.	$3.85
Com. wire nails, base per keg	3.05c.
Cement c't'd nails, base per keg	3.05c.

NEW YORK

	Base per Lb.
Plates, ¼ in. and heavier	3.45c.
Structural shapes	3.42c.
Soft steel bars, small shapes	3.32c.
Iron bars	3.32c.
Iron bars, swed. charcoal	6.50 to 7.25c.
Cold-fin. shafting and screw stock;	
Rounds and hexagons	3.92c.
Flats and squares	4.42c.
Cold-roll. strip, soft and quarter hard	3.52c.
Hoops	3.67c.
Bands	3.67c.
Hot-rolled sheets (No. 10)	3.42c.
Hot-rolled ann'l'd sheets (No. 24*)	4.05c.
Galvanized sheets (No. 24*)	4.65c.
Long terne sheets (No. 24)	5.40c.
Standard tool steel	11.00c.
Wire, black annealed (No. 10)	3.30c.
Wire, galv. (No. 10)	3.80c.
Tire steel, 1 x ½ in. and larger	3.65c.
Open hearth spring steel	4.00c. to 10.00c.
Common wire nails, base, per keg	$3.25
	Per Cent Off List
Machine bolts, cut thread:	
Up to 1 in. dia. inclusive	60
Over 1 in. dia.	50
Carriage bolts, cut thread:	
Up to ½ in. dia. inclusive	60
Over ½ in. dia.	50
	Per 100 Ft.
Boiler tubes:	
Lap welded, 2-in.	$18.05
Seamless welded, 2-in.	19.24
Charcoal iron, 2-in.	24.94
Charcoal iron, 4-in.	63.65

*No. 28 and lighter, 36 in. wide, 20c. higher per 100 lb.

ST. LOUIS

	Base per Lb.
Plates and struc. shapes	3.49c.
Bars, soft steel or iron	3.29c.
Cold-fin. rounds, shafting, screw stock	3.74c.
Hot-rolled annealed sheets (No. 24)	3.94c.
Galv. sheets (No. 24)	4.54c.
Hot-rolled sheets (No. 10)	3.44c.
Black corrug. sheets (No. 24)	3.99c.
*Galv. corrug. sheets	4.59c.
Structural rivets	3.84c.
Boiler rivets	3.94c.
	Per Cent Off List
Tank rivets, 7/16 in. and smaller	60
Machine and carriage bolts, lag screws, fittings un bolts, bolt ends, plow bolts, hot-pressed nuts, square and hexagon, tapped or blank, semi-finished nuts	
1000 lb. or over	60
200 to 999 lb.	55 and 5
100 to 199 lb.	50 and 5
Less than 100 lb.	50

*No. 26 and lighter take special prices.

PHILADELPHIA

	Base per Lb.
*Plates, ¼-in. and heavier	3.00c.
*Structural shapes	3.00c.
*Soft steel bars, small shapes, iron bars (except bands)	3.00c.
‡Reinforc. steel bars, sq. twisted and deformed	2.955c.
Cold-finished steel bars	3.73c.
*Steel hoops	3.55c.
*Steel bands, No. 12 and 3/16 in., incl.	3.30c.
Spring steel	5.00c.
†Hot-rolled anneal. sheets (No. 24)	3.80c.
†Galvanized sheets (No. 24)	4.40c.
*Hot-rolled annealed sheets (No. 10)	3.20c.
Diam. pat. floor plates, ¼ in.	5.00c.
Swedish iron bars	6.25c.

These prices are subject to quantity differentials except on reinforcing and Swedish iron bars.

*Base prices subject to deduction on orders aggregating 4000 lb. or over.

†For 50 bundles or over.

‡For less than 2000 lb.

CLEVELAND

	Base per Lb.
Plates and struc. shapes	3.36c.
Soft steel bars	3.05c.
Reinforc. steel bars	*2.10c.
Cold-finished steel bars	3.40c.
Flat rolled steel under ¼ in.	3.51c.
Cold-finished strip	†3.20c.
Hot-rolled annealed sheets (No. 24)	4.16c.
Galvanized sheets (No. 24)	4.76c.
Hot-rolled sheets (No. 10)	3.26c.
Hot-rolled 3/16 in. 24 to 48 in. wide sheets	3.61c.
Black ann'l'd wire, per 100 lb.	$2.65
No. 9 galv. wire, per 100 lb.	3.00
Com. wire nails, base per keg	2.40

*Plus mill, size and quantity extras.

†Outside delivery 10c. less.

CINCINNATI

	Base per Lb.
Plates and struc. shapes	3.45c.
Bars, soft steel or iron	3.25c.
New billet reinforc. bars	3.10c.
Rail steel reinforc. bars	3.10c
Hoops and bands, 3/16 in. and lighter	3.60c.
Cold-finished bars	3.70c.
Hot-rolled annealed sheets (No. 24)	4.25c.
Galv. sheets (No. 24)	4.85c.
Hot-rolled sheets (No. 10)	3.35c.
Structural rivets	4.35c.
Small rivets	55 per cent off list
No. 9 ann'l'd wire, per 100 lb.	$3.00
Com. wire nails, base per keg (10 to 49 kegs)	2.65
Larger quantities	2.50
Cement c't'd nails, base 100-lb. keg.	2.95
Chain, 1-in., per 100 lb.	8.35
	Net per 100 Ft.
Seamless steel boiler tubes, 2-in.	$17.89
4-in.	41.69
Lap-welded steel boiler tubes, 2-in.	16.61
4-in.	38.72

BUFFALO

	Base per Lb.
Plates	3.40c.
Struc. shapes	3.30c.
Soft steel bars	3.10c.
Reinforcing bars	2.10c.
Cold-fin. flats and sq.	3.55c.
Round and hex.	3.55c.
Cold-rolled strip steel	5.25c.
Hot-rolled annealed sheets (No. 24)	4.05c.
Heavy hot-rolled sheets, 3/16 in., 24 to 48 in. wide	3.67c.
Galv. sheets (No. 24)	4.65c.
Bands	3.57c.
Hoops	3.57c.
Hot-rolled unannealed sheets	3.32c.
Com. wire nails, base per keg	$3.00
Black wire, base per 100 lb.	3.45c.

BOSTON

	Per Lb.
Beams, channels, angles, tees, zees	3.42c.
H beams and shapes	3.42c.
Plates—sheared, tank and univ. mill, ¼ in. thick and heavier	3.43c.
Floor plates, diamond pattern	5.18c.
Bar and bar shapes (mild steel)	3.25c.
Bands 3/16 in. thick and No. 12 ga. incl.	3.50c. to 4.50c.
Half rounds, half ovals, ovals and bevels	4.50c.
Tire steel	4.50c.
Cold-finished rounds and hexagons	3.70c.
Cold-rolled strip steel	5.20c.
Cold-finished squares and flats	4.20c.
Blue annealed sheets, No. 10 ga.	3.25c.
One pass cold-rolled sheets No. 24 ga.	3.50c.
Galvanized steel sheets, No. 24 ga.	4.60c.
Lead coated sheets, No. 24 ga.	5.65c.

Prices delivered by truck in metropolitan Boston, subject to quantity differentials.

PACIFIC COAST

	Base per Lb.		
	San Francisco	Los Angeles	Seattle
Plates, tank and U. M.	3.55c.	3.70c.	3.55c.
Shapes, standard	3.55c.	3.70c.	3.55c.
Soft steel bars	3.60c.	3.70c.	3.55c.
Reinforcing bars	3.50c.	3.50c.	3.50c.
Hot-rolled annealed sheets (No. 24)	4.40c.	4.35c.	4.40c.
Hot-rolled sheets (No. 10)	3.75c.	3.80c.	3.75c.
Galv. sheets (No. 24)	5.00c.	5.05c.	5.00c.
Cold finished steel			
Rounds	5.95c.	5.95c.	4.75c.
Squares and hexagons	7.20c.	7.20c.	6.00c.
Flats	7.70c.	7.70c.	7.00c.
Common wire nails —base per keg	$3.40	$3.25	$3.35
less carload			

All items subject to differentials for

Hot-Finished Lapweld Steel Pressure Tubes

Base Prices f.o.b. Pittsburgh per 100 ft. Lots of 10,000 lb. or ft. or More.

Minimum Wall—Cut Lengths 4 ft. to 24 ft. Inclusive.

Open-Hearth Steel—Low Carbon, 0.10 to 0.25 per cent Average

Outside Diameter in Inches.

Thickness: Inches in Decimals	Thickness: BWG and Fractions	Wt.	1½ In.	1¾ In.	2 In.	2¼ In.	2½ In.	2¾ In.	3 In.	3¼ In.	3½ In.	4 In.	4½ In.	5 In.	5½ In.	6 In.
0.095	13	Per ft.	1.619 lb.	1.910	2.201	2.492	2.783	3.074	3.365	3.657	3.948	....	....	....	....	....
		100 ft.	$9.72	11.06	12.38	13.79	15.18	16.43	17.03	18.30	19.53	....	....	....	....	....
0.109	12	Per ft.	1.836 lb.	2.169	2.503	2.837	3.171	3.504	3.838	4.172	4.506	....	....	....	....	....
		100 ft.	$10.53	12.09	15.16	15.16	16.58	17.54	18.35	19.84	21.33	....	....	....	....	....
0.120	11	Per ft.	1.994 lb.	2.360	2.726	3.092	3.457	3.823	4.189	4.555	4.921	5.652	....	....	....	....
		100 ft.	$11.01	12.78	14.41	16.17	17.68	18.70	19.91	21.56	23.15	26.59	....	....	....	....
0.134	10	Per ft.	2.201 lb.	2.610	3.018	3.427	3.835	4.244	4.652	5.061	5.469	6.286	7.103	7.920	8.737	....
		100 ft.	$11.76	13.67	15.56	17.48	19.08	20.40	22.02	23.81	25.62	28.66	35.22	41.44	47.76	....
0.148	9	Per ft.	2.402 lb.	2.854	3.305	3.756	4.207	4.658	5.110	5.561	6.012	6.915	7.817	8.720	9.622	10.52
		100 ft.	$12.42	14.48	16.50	18.37	20.04	21.68	23.58	25.66	28.11	31.29	38.15	44.25	51.18	58.00
0.165	8	Per ft.	2.646 lb.	3.151	3.656	4.160	4.665	5.169	5.674	6.179	6.683	7.693	8.702	9.711	10.72	11.73
		100 ft.	$13.16	15.41	17.68	20.02	21.56	23.85	26.19	28.52	30.84	34.78	42.04	48.81	55.98	62.33
0.180	7	Per ft.	2.847 lb.	3.397	3.947	4.497	5.047	5.597	6.147	6.697	7.247	8.347	9.447	10.55	11.65	12.75
		100 ft.	$14.43	16.69	19.15	21.74	23.67	25.83	28.37	30.91	33.44	37.69	45.18	52.51	60.27	68.14
0.203	6	Per ft.	3.142 lb.	3.761	4.381	5.000	5.620	6.239	6.858	7.478	8.097	9.336	10.58	11.81	13.05	14.29
		100 ft.	$16.23	18.55	21.34	24.35	26.73	28.79	31.65	34.51	36.90	42.08	50.08	57.98	66.87	76.37
0.220	5	Per ft.	3.348 lb.	4.018	4.689	5.359	6.029	6.699	7.369	8.039	8.710	10.05	11.39	12.73	14.07	15.41
		100 ft.	$17.95	20.05	23.14	26.44	29.36	31.63	34.38	36.87	39.18	45.20	53.25	61.74	71.41	79.72
0.250	¼	Per ft.	3.708 lb.	4.472	5.235	5.999	6.763	7.526	8.290	9.053	9.817	11.34	12.87	14.40	15.93	17.45
		100 ft.	$20.24	22.45	26.04	29.78	33.24	35.97	39.15	41.52	43.59	49.22	59.40	69.84	80.84	90.27
0.313	5/16	Per ft.	4.366 lb.	5.322	6.278	7.234	8.190	9.146	10.10	11.06	12.01	13.92	15.84	17.75	19.66	21 57
		100 ft.	$25.11	27.75	31.42	36.13	40.52	44.74	48.27	50.72	53.32	60.41	72.48	85.06	98.81	111.58
0.375	⅜	Per ft.	4.907 lb.	6.052	7.198	8.343	9.489	10.63	11.78	12.93	14.07	16.36	18.65	20.94	23.23	25.52
		100 ft.	$29.66	33.04	36.25	41.89	47.30	53.20	56.96	53.67	62.47	71.00	84.47	100.34	116.75	130.76

DEDUCTIONS ON PRESSURE TUBES

	Distributor	Jobber
40,000 lb. or ft. or more	5 per cent	none
25,000 lb. or ft. to 39,999 lb. or ft.	5 per cent	none
10,000 lb. or ft. to 24,999 lb. or ft	7½ per cent	5 per cent
2000 lb. or ft. to 9999 lb. or ft	7½ per cent	5 per cent
Under 2000 lb. or ft.	10 per cent	5 per cent

Fabricated Structural Steel

Awards in Smaller Volume—New Projects Decline

LETTINGS of 16,200 tons compare with 29,825 tons in the previous week and 11,800 tons two weeks ago. Outstanding awards are 3200 tons for the third section of the Philadelphia-Camden bridge over the Delaware River and 2000 tons for a strip mill at Struthers, Ohio, for the Youngstown Sheet & Tube Co. New projects of 12,300 tons compare with 23,500 tons last week. The only sizable new job is 1800 tons for an armory in Jersey City, N. J. Plate awards total more than 3200 tons. Structural steel awards for the week follow:

NORTH ATLANTIC STATES

Walpole, N. H., 200 tons, bridge, to Lackawanna Steel Construction Co.

Everett, Mass., 300 tons, screening station, to New England Structural Co.

Long Island Railroad, 450 tons, bridge at Glendale, N. Y., to McClintic-Marshall Corpn.

Pennsylvania Railroad, 125 tons, three bridges, to Fort Pitt Bridge Works Co.

Philadelphia, 250 tons, refuge station, to McClintic-Marshall Corpn.

Turtle Creek, Pa., 225 tons, school, to Levinson Steel Co.

Camden, N. J., 3200 tons, section No. 3 of Philadelphia-Camden bridge, to McClintic-Marshall Corpn.

Camden, 1500 tons of sheet piling for Philadelphia-Camden bridge, to Kalman Steel Corpn.

SOUTH AND SOUTHWEST

Charlottesville, Va., 315 tons, University of Virginia building, to Carolina Iron & Steel Co.

Lexington, Ky., 140 tons, high school, to Bedford Foundry & Machine Co.

State of Louisiana, 145 tons, bridge on project No. 598, to Jones & Laughlin Steel Corpn.

Caldwell Parish, La., 250 tons, bridge, to McClintic-Marshall Corpn.

Fayetteville, Ark., 160 tons, library, to Fort Smith Structural Steel Co.

Jacksonville, Fla., 920 tons sheet piling for Government dike, to Inland Steel Co.

Fort Worth, Tex., 900 tons, State highway bridge, to Fort Worth Structural Steel Co.

Prescott, Ariz., 125 tons, stadium at State fair grounds, to Allison Steel Mfg. Co.

CENTRAL STATES

Struthers, Ohio, 2000 tons, strip mill building for Youngstown Sheet & Tube Co., to Fort Pitt Bridge Works Co.

Detroit, 400 tons, plant addition for Rotary Electric Steel Co., to R. C. Mahon Co.

Pere Marquette Railroad, 320 tons, transfer bridge at Detroit, to American Bridge Co.

Donovan, Ill., 260 tons, State highway bridge, to American Bridge Co.

Duquoin, Ill., 1100 tons, coal washer, to Koppers Co.

Chicago, 1400 tons, stockyard auditorium, to Hanson-Elcock Foundry Co.

Mills County, Iowa, 185 tons, bridge, to Pittsburgh-Des Moines Steel Co.

Washington County, Iowa, 350 tons, bridge, to Clinton Bridge Co.

Guthrie County, Iowa, 130 tons, bridge, to Pittsburgh-Des Moines Steel Co.

St. Louis, 230 tons, bridge, to Stupp Brothers Bridge & Iron Co.

WESTERN STATES

Worland, Wyo., 430 tons, bridge, to Minneapolis-Moline Power Implement Co.; previously reported to an unnamed bidder.

Boulder Dam, 600 tons, cranes, to Harnischfeger Corpn.

Bonner County, Idaho, 615 tons, State bridge, to American Bridge Co.

San Mateo County, Cal., 135 tons, grandstand at race track, to McClintic-Marshall Corpn.; incorrect tonnage reported last week.

Los Angeles, 680 tons, Balboa Brewing Co. building; 500 tons to South West Welding & Mfg. Co.; 180 tons, to Pacific Iron & Steel Co.

NEW STRUCTURAL STEEL PROJECTS

NORTH ATLANTIC STATES

Rochester, N. Y., 1800 tons, Rundel Memorial Building. Hunkin-Conkey Construction Co., Cleveland, low bidder for general contract.

Rochester, N. Y., 810 tons, Elmwood Avenue bridge for city.

Corning, N. Y., 150 tons, armory.

Jersey City, N. J., 1800 tons, State armory.

Pittsburgh & West Virginia Railway, 200 tons, bridge at Monongahela, Pa.

Washington, 500 tons, Department of Agriculture radio towers.

SOUTH AND SOUTHWEST

Chesapeake & Ohio Railroad, 200 tons, bridge at Hawks Nest, W. Va.

Newport, Ark., 690 tons, White River bridge.

Montgomery, Ala., 200 tons, bridge.

CENTRAL STATES

State of Indiana, 320 tons, bridges.

Fairport, Ohio, 1000 tons, sheet steel piling for breakwater. Merritt, Chapman & Whitney, Cleveland, low bidder for general contract.

Toledo, 900 tons, office building for Electric Auto-Lite Co.

Cleveland, 600 tons, Easterly Sewage Disposal plant.

State of Ohio, 350 tons, State highway bridges in Madison, Perry, Trumbull, Williams and Fayette counties; bids June 22.

Columbus, Ohio, 200 tons, remodeling Masonic temple.

Grand Trunk Western Railroad, 170 tons, bridge at Lansing, Mich.

Wellston, Mich., 800 tons, Manistee River bridge.

State of Illinois, 2665 tons, highway projects; Madison County, 1120 tons; Peoria County, 645 tons; Cook County, 900 tons; bids to be opened June 19.

State of Missouri, 300 tons, highway projects; bids June 15.

Rhodes, Iowa, 650 tons, bridge.

WESTERN STATES

State of Colorado, 300 tons, bridges.

Boulder Dam, 500 tons, 17 cranes; bids June 18.

FABRICATED PLATE

AWARDS

Point Breeze, Pa., 145 tons, 8 tanks for Atlantic Refining Co., to Downington Iron Works.

Thomasville, N. C., 550 tons, elevated tank, to Chicago Bridge & Iron Works.

East Chicago, Ind., 225 tons, tanks, to Chicago Bridge & Iron Works.

Kansas City, Kan., 200 tons, tanks, to Chicago Bridge & Iron Works.

Oakland, Cal., 1650 tons, material for East Bay Municipal Utilities District, to Steel Tank & Pipe Co.

Albuquerque, N. M., 450 tons, material for Rio Grande Conservation District, to Wyatt Metal & Boiler Works.

NEW PROJECTS

Sharon, Mass., 125 tons, standpipe.

Y. S. & T. Contracts For Continuous Hot Strip Mill

YOUNGSTOWN Sheet & Tube Co., Youngstown, Ohio, has placed a contract with the Mesta Machine Co., Pittsburgh, for its wide continuous hot strip mill to be erected at its Campbell Works at Struthers, Ohio. It has also placed 2000 tons of structural steel for its mill building.

The mill equipment will consist of two slab reheating furnaces, one 96-in. 4-high spreading mill and nine tandem stands of 79-in. 4-high mills, complete with hot coilers, run-out tables, hot leveling and shearing equipment, piling rack and other necessary equipment.

The mill will have a capacity for producing ½-in. to 5/64-in. thick flat rolled material up to 74 in. wide; 16-gage to 60 in. wide, and 18-gage to 48 in. wide. The monthly capacity will be from 40,000 to 60,000 net tons.

The mill will produce hot rolled sheets in the heavier gages, pipe skelp for both fire weld and electric weld pipe, commercial plate and hot rolled strip. It also will break down sheet bars for the present hand sheet mills at both Campbell and Brier Hill Works.

In connection with the installation, improvements will be made to the No. 2 blooming mill so that No. 1 bloomer can be dismantled to make room for the new mill. It will render obsolete the present sheet bar mill and the 30-in. Universal skelp mill.

A 3-phase 500-lb. operating charge size electric furnace is in daily operation for the melting and refining of iron and steel in the new Ford Building at the Chicago World's Fair. This is the first time an electric melting and refining furnace has been exhibited in actual operation except at several foundry conventions. The unit was installed by the Pittsburgh Lectromelt Furnace Corpn., Pittsburgh.

Reinforcing Steel

Awards 1700 Tons—New Projects 9900 Tons

Newburyport, Mass., 300 tons, high bridges, to Concrete Steel Co.

Palmyra, N. Y., 100 tons, New York Central Railroad crossing elimination, to Truscon Steel Co.

Camden, N. J., 400 tons, section No. 3 of Philadelphia-Camden bridge, to Kalman Steel Corpn.

Griffiths, Ind., 100 tons, bridge to Concrete Steel Co.

State of Illinois, 100 tons, highway work, to Concrete Steel Co.

Oakland, Cal., 445 tons, terminal building, to W. S. Wetenhall Co., sublet to Judson Mfg. Co.

State of Colorado, 260 tons, highway bridges in seven counties, to unnamed bidders.

NEW REINFORCING BAR PROJECTS

State of Pennsylvania, 3000 tons, road projects; bids June 15.

Chicago, 200 tons, building at 25 North Dearborn Street.

Niles Center, Ill., tonnage being estimated, school building.

State of Illinois, 100 tons, paving projects; bids June 19.

St. Louis, 125 tons, Oakland Avenue viaduct; Fruin-Colnon Contracting Co., St. Louis, general contractor.

State of Missouri, 150 tons, paving projects; bids June 15.

Boulder Dam, Nev., 5500 tons, Proposal 23,140-A; 14 identical bids submitted.

San Francisco, 425 tons, enlargening of O'Shaughnessy dam; bids soon.

Hollywood, Cal., 250 tons, Kress store; general contract awarded.

State of Washington, 165 tons, bridges in Skaget and Island Counties; bids June 19.

Cast Iron Pipe

New York is asking bids until June 15 for about 250 tons of 8 and 12-in. tenders to be submitted to Department of Water Supply.

Pearisburg, Va., closed bids June 15 for 3500 ft. of 4 to 8-in. for water supply. J. B. McCrary Co., Inc., Atlanta, Ga., is consulting engineer.

General Purchasing Officer, Panama Canal, Washington, asks bids until June 28 for about 1000 ft., with fittings (Schedule 2970).

Junction City, Ky., asks bids until June 19 for pipe for water supply, also for other waterworks equipment. Howard K. Bell, McClelland Building, Lexington, Ky., is consulting engineer.

Sevierville, Tenn., asks bids until June 20 for water pipe line. Appropriation has been arranged. Freeland, Roberts & Co., Independent Life Building, Nashville, Tenn., are consulting engineers.

Quitman, Miss., asks bids until June 18 for 23,850 ft. of 6 to 12-in.; also for pumping equipment, pipe fittings, valves, etc., for water system. Fund of $30,000 has been arranged. P. A. O'Brien, 953 North Street, Jackson, Miss., is consulting engineer.

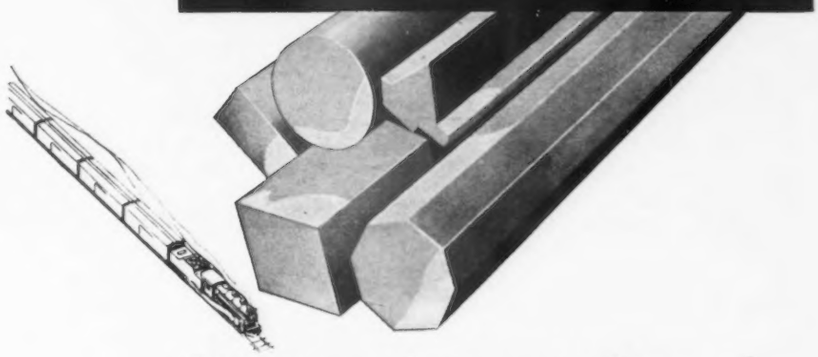
Port Lavaca, Tex., plans water pipe line system. Special election will be held June 26 to approve bonds for $54,000 for this and other waterworks extensions. J. C. McVea, 1318 Kipling Street, Houston, Tex., is consulting engineer.

Lansing, Mich., has awarded 200 tons to James B. Clow & Sons.

WYCKOFF

delivers precision and perfection in

COLD DRAWN STEELS



Whether your steel requirements call for micrometric precision as to size and dimension—or whether your production demands steel of unusual physical and chemical properties, or both,—you can always depend on **WYCKOFF** to meet your exact needs—quickly and economically.

Large stocks are always carried at both our Chicago and Ambridge plants ready for immediate shipment. Have you sent for your copy of the new **WYCKOFF** steel chart?

WYCKOFF DRAWN STEEL COMPANY

GENERAL OFFICES: Ambridge, Pa.
MILLS at Ambridge, Pa. and Chicago, Ill.

Manufacturers of
COLD DRAWN STEELS
Turned and Polished Shafting, Turned and Ground Shafting

Chicago has placed 1100 tons with Glamorgan Pipe & Foundry Co.

Chicago will buy 103 tons of standard special castings for 3 to 24-in. water pipe.

Vienna, Ill., will take bids soon for pipe for water supply, elevated steel tank and tower, pumping machinery and other waterworks equipment. Fund of $60,000 has been arranged. Warren & Van Praag, Inc., Decatur, Ill., are consulting engineers.

Cedar Rapids, Iowa, has placed 500 tons with James B. Clow & Sons.

Madison, S. D., closed bids June 11 for 3100 ft. of 4 to 10-in. for water supply.

Naval Purchasing Officer, San Francisco, has awarded 240 tons to United States Cast Iron Pipe Co.

Long Beach, Cal., has placed 140 tons with United States Cast Iron Pipe Co.

Railroad Equipment

E. I. du Pont de Nemours & Co., Inc., has ordered two tank cars from American Car & Foundry Co.

Seaboard Air Line has ordered 10 steel underframes from American Car & Foundry Co.

National Railways of Columbia are inquiring for 20 coaches, two dining cars, and four baggage-mail cars. Roberto J. Herrera, Bogota, Colombia, is director.

Flexible Couplings.—Westinghouse Electric & Mfg. Co., East Pittsburgh. New general purpose coupling is described in bulletin 72-130. Designed for use in connection with gear motors, speed reducers and other industrial drives, it requires no lubrication, is easily inspected and safe in operation.

TOOL STEEL TUBING

NON-SHRINK
OIL HARDENING
NON-DEFORMING

for RING DIES
CUTTING DIES
SPACERS, BUSHINGS, Etc.

Manufacturers of BISCO Tungsten Carbide drawing dies for wire, rod and tubing.

THE BISSETT STEEL CO., INC.
945 E. 67th ST. CLEVELAND, OHIO
Cincinnati Worcester Buffalo

Today's Pickling Practice in Iron and Steel

(Concluded from Page 15)

its turn each shift puts down in the space allotted for this purpose the acid used and the tonnage of steel pickled.

A chart of this nature provides a complete set-up of the pickling operation at a glance and has been found to be a material aid in keeping this operation under close supervision.

Are there any factors and local conditions which might change this entire set-up? Plenty of them. In fact, so many that it would be impossible to enumerate even a small portion of them here; but it might be well to mention that quite often what are claimed to be factors which would prevent the use of the foregoing practice are nothing more or less than worn-out tradition with its fear of high acid and low temperature.

In pickling, as in everything else, the old order changes. Makeshift unscientific practices and untrained operators have been and are being replaced by modern equipment, modern aids and modern methods. Improved equipment and the development of pickling aids in the form of good inhibitors have dethroned the old order, and are lifting the pickling room itself out of the slough of fog, filth and fumes; and experienced practical picklers belonging to plant personnel or sponsored by acid and inhibitor manufacturers are raising the pickling department to the same high standard of efficiency and economy that prevails today in the other branches of the industry.

Corrosion Problems in Iron and Steel

(Concluded from Page 31)

subjecting the metal, and the producer, who is in a position to modify the properties of the metal supplied. Special problems arising in a particular industry have been studied by groups of investigators directly connected with that industry; for instance, the American Petroleum Institute, the American Society of Refrigerating Engineers and the Bell Laboratories of the American Telephone and Telegraph Co. have done notable work in their respective fields. More general problems have been studied extensively by committees of the American Society for Testing Materials, on which both consumers and manufacturers have been represented.

The present system is producing results with probably the least amount of organization, but it seems desirable that there should be a national group representing those who are engaged on special industrial work to encourage and sponsor scientific research on fundamental problems relating to corrosion.

Last September at an International Conference on Corrosion held in Chicago under the auspices of the Electrochemical Society, a considerable amount of overlapping and duplication of research work was apparent. The suggestion was made by one of the foreign contributors that a plan for international cooperation on some of these problems might be developed to advantage.

Plant Expansion and Equipment Buying

Empire State Refining Corpn., Bolivar, N. Y., operating oil refinery and natural gas properties, has arranged for stock issue of $141,780, part of proceeds to be used for plant expansion and equipment.

Tobin Packing Co., Rochester, N. Y., meat packer, care of H. Peter Henschien, 59 East Van Buren Street, Chicago, architect and engineer, will take bids at once on general contract for new plant at Fort Dodge, Iowa, with main three-story unit, 175 x 230 ft., power house, refrigerating plant and other structures. Cost over $250,000 with equipment.

Electric Auto-Lite Co., Champlain and Mulberry Streets, Toledo, Ohio, manufacturer of automobile lighting and starting equipment, has purchased plant and business of Owen Dyneto Corpn., 301 Wolf Street, Syracuse, N. Y., manufacturer of kindred products, including ignition equipment, etc. Acquired plant will be continued as Eastern works.

Sherwin-Williams Co., 115th Street and Cottage Grove Avenue, Chicago, manufacturer of paints, varnishes, etc., with headquarters at Cleveland, has asked bids on general contract for three-story and basement addition. Cost over $75,000 with equipment.

City Council, Hastings, Neb., asks bids until June 18 for boiler, superheater, forced draft fans, economizer, soot blowers, feed-water equipment, and accessories, and one 25-ton overhead crane for addition to municipal electric light and power plant. Fund of $75,000 has been arranged for present purchases out of total appropriation of $157,912. Black & Veatch, Mutual Building, Kansas City, Mo., are consulting engineers.

Invincible Dust Collecting Systems, Inc., 2422 Homer Street, Chicago, has been organized by Joseph F. Fernoch and John G. Erickson, to manufacture mechanical-cleaning, air-conditioning, collecting equipment and systems.

Minnesota Mining & Mfg. Co., Forest Street, St. Paul, Minn., manufacturer of roofing products, abrasive materials, sandpaper, etc., has let general contract to William M. Murphy & Son, New York Building, for one-story addition to quarrying and raw material plant at Wausau, Wis., for crushing and screening. Cost about $30,000 with equipment. Toltz, King & Day, Inc., Pioneer Building, St. Paul, is architect.

Board of Regents, Municipal University of Omaha, Omaha, Neb., plans new steam power house and engineering laboratory to cost about $80,000 with equipment. Work will be carried out in connection with group of 11 new buildings, including multi-story liberal arts building, cost $400,000, and science building, cost $167,000. Fund of $900,000 is being arranged for entire project. John Latenser & Sons, Peters Trust Building, are architects.

Northern Pump Co., 920 Eighteenth Avenue, N. E., Minneapolis, has begun work on one-story building, 38 x 125 ft., for storage and distributing, for which general contract recently was let to R. J. Keehn, 621 South Third Street.

Barnsdall Refineries, Inc., 324 East Wisconsin Avenue, Milwaukee, has placed contract with W. W. Ofelin, Inc., 312 East Wisconsin Avenue, for erection of $150,000 bulk storage and distributing plant. W. T. Hansen is division engineer.

Board of Education, Long Beach, Cal., will soon take bids on general contract for new one-story vocational shop and four storage and distributing buildings. Cost about $75,000 with equipment. Roger K. Nissen and William K. Beach, 1235 East Tenth Street, are architects.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until June 22 for two Diesel engines and spare parts (Schedule 2678) for Mare Island and Puget Sound Navy Yards; 20,800 lb. black and galvanized sheet steel (Schedule 2688) and 7680 lb. sheet lead (Schedule 2686) for Puget Sound yard.

Sheet Mill Economies with Combination System

MECHANIZATION of sheet mills was referred to at some length in a paper by Eric R. Mort, Swansea, Wales, presented to the (British) Iron and Steel Institute, on "The Manufacture of Full-Finished Steel Sheets." He pointed out that the effort to step up production of a given installation thereby to reduce cost "has been closely studied by an American engineering concern — collaborating with one of the largest sheet and tin plate producers—who have developed what they call the "combination system." What he had to say was as follows:

Before the introduction of this system the desire for increased outputs was met in America by the "relay" and "double-crew" systems. The latter resulted in a production increase ranging up to about 40 per cent over that obtainable by the old system; it really amounts to a more efficient use of existing equipment, as there is less time wasted and both stands operate nearer to capacity. Needless to say, the increase in output is largely determined by the capacity of the furnaces to supply properly-heated bars and packs, and continuous furnaces are almost essential to obtain the full benefits of the system.

Combination System Described

Briefly, the combination system consists of a revamping of sheet and tin mill methods by using mechanical contrivances, continuous furnaces, and conveyors as a means of increasing the output. The object is to cut down the handling of the material to a minimum, and a short description of how this is accomplished may be of interest. First, the bars and packs are heated in continuous furnaces with automatic discharge arrangements, and are delivered to the mill by gravity conveyors. The bars are roughed down in the ordinary way, matched, and conveyed to the charging end of the pack furnace, where they are reheated and delivered on to the automatic feeder table of the finishing mill. Two roughing stands are usually employed to supply one finishing mill. The latter may also be equipped with a mechanical catcher, which returns the pack to the roller automatically. The finished hot-rolled sheets then pass to a cooling conveyor and so to the next operation.

Remarkable results have been achieved by this mechanization. An Indian mill has recently rolled as much as 65.7 tons in an 8-hr. turn on a three-mill unit comprising two roughing stands and one finishing stand—that is, 22 tons per stand. Weekly averages are in the neighborhood of 50 tons per shift on orders of which 97.5 per cent are 24-gage.

The combination system gives the increased outputs at a lower cost per ton than the double-crew system, particularly if automatic feeding and catching tables are employed. In any case, the labor is not so arduous and mill rates are therefore subject to revision. Based on American practice, the following observations may be made regarding the reduction in costs brought about by mechanization—the mill rates being revised so as to be commensurate with the labor involved and the increased production:

Taking the old-style single-mill system as 100 per cent, working the old-style double-mill system permitted a lowering of the hot-rolling cost to about 90.5 per cent. By working the new-style double-mill system without automatic feeders and catchers, the following average results were obtained on 21-gage stock:

For an output of 25 tons per 8-hr. turn, the cost is reduced to 59.3 per cent.
For an output of 36 tons per 8-hr. turn, the cost is reduced to 44.5 per cent.
For an output of 48 tons per 8-hr. turn, the cost is reduced to 36.2 per cent.

Using an automatic feeder and catcher on the finishing mill, these rates are further reduced as follows:

For an output of 25 tons per 8-hr. turn, the cost is reduced to 53.3 per cent.
For an output of 36 tons per 8-hr. turn, the cost is reduced to 40.4 per cent.
For an output of 48 tons per 8-hr. turn, the cost is reduced to 33.1 per cent.

For outputs in excess of about 48 tons per 8-hr. turn it is planned to use three-high roughing and finishing mills.

These figures will serve to illustrate the possibilities of the combination system, which has been installed in a number of American plants. The hot-rolling costs per ton obtainable by the system seem to be comparable with those of any other method of hot rolling, while the unit is infinitely more flexible and less costly to install than a large wide-strip mill. The latter, however, has certain advantages which cannot be denied if it is possible to operate at a fairly high percentage of capacity.

Heating practice is exceedingly good and the uniformity and regularity of the whole process is such that there is a noticeable increase in the quality of the material rolled. The scrap loss is reduced, the scaling is lighter (facilitating pickling), and the sheet and roll surfaces are thereby improved. In addition, there is greater gage uniformity.

Of late, a great deal of interest has been displayed in three-high mills for both roughing and finishing, and exceedingly large tonnages have been rolled on mills of this type, fitted with automatic auxiliary equipment.

PROF. PAUL H. DOUGLAS, professor of economics at the University of Chicago, will address the Purchasing Agents' Association of Chicago, on Thursday evening, June 14, at the Blackstone Hotel. Professor Douglas, now serving as a member of the Consumers' Advisory Board in Washington, will speak on the subject "Ways of Protecting the Purchaser."

PLANT EXPANSION AND EQUIPMENT BUYING

Labor Uncertainty Delays Machine Tool Buying—Inquiry Sustained

THE threat of increasing labor trouble is still the most important depressing influence in the machine tool market. The automotive industry is being very secretive regarding its plans for tool buying in order to keep labor in the dark as much as possible. While inquiries from this industry on which bids have already been submitted involve at least $1,000,000, no action is being taken and the prospect of early purchases is fading.

New inquiry is the most encouraging thing about the market. The railroads seem more active. The Milwaukee Road is in the market for a 42-in. car wheel borer and a motor-driven axle lathe. The Burlington is expected to purchase a 42-in. boring mill or vertical turret lathe and a 36-in. heavy duty shaper.

NEW ENGLAND

Baird-Daniels Co., Inc., 36 Front Street, New York, distiller, has plans for extensions and improvements in plant at Warehouse Point, Conn., including equipment. Cost about $60,000 with machinery.

Town Water Department, Sharon, Mass., E. E. Farnham, superintendent, will soon take bids for new steel standpipe. Weston & Sampson, 14 Beacon Street, Boston, are consulting engineers.

Frank Jones Brewing Co., Portsmouth, N. H., plans rebuilding part of four-story plant recently destroyed by fire, with loss over $80,000 with equipment.

Kendall Boiler & Tank Co., Cambridge, Mass., has been organized by Frank J. Holderried, 275 Third Street, and associates, to manufacture boilers, tanks and other plate products.

Haddam Distillers Corpn., Moodus, Conn., David L. Nair, treasurer, has arranged for stock issue of $218,750, part of proceeds to be used for expansion.

Four Wheel Drive Auto Co., East Twelfth Street, Clintonville, Wis., manufacturer of motor trucks, parts, etc., has leased building at 130 North Beacon Street, Brighton, Mass., for new factory branch, service and repair division.

White Fuel Corpn., 888 East First Street, Boston, has plans for a coal handling plant.

NORTH ATLANTIC

Atlantic Refining Co., 260 South Broad Street, Philadelphia, has acquired 35 acres on waterfront at Rensselaer, N. Y., as site for new bulk oil storage and distributing terminal, to include ten or more steel tanks, pumping station, power house, etc. Cost about $500,000 with equipment.

Continental Baking Co., Inc., 285 Madison Avenue, New York, has plans for three-story automobile service, repair and garage building, 100 x 110 ft., with shop facilities for company trucks and cars. Cost about $40,000 with equipment. H. E. Hildebrand is company architect.

Standard Brands, Inc., 595 Madison Avenue, New York, manufacturer of food products, alcoholic liquors, etc., plans new four-story plant at Peekskill, N. Y. Cost over $85,000 with equipment.

First National Petrol Co., Queens Plaza, Long Island City, has taken out permit for new bulk oil storage and distributing plant, to include several units with steel tanks, pumping station, etc. Cost about $85,000 with equipment.

Castleton Metal Mfg. Co., Inc., Shodack, N.Y., has been organized by Scott K. Gray, Jr., 75 State Street, and George M. Simon, 11 North Pearl Street, both Albany, N. Y., to manufacture metal specialties.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until June 19 for 19,400 lb. steel forgings for Brooklyn Navy Yard and 19,400 lb. steel forgings for Philadelphia yard (Schedule 2702); 15,000 ft. shop decking (Schedule 2689) for Brooklyn yard; until June 26, for brass voice tubing for Brooklyn and Puget Sound yards (Schedule 2709), 15,000 ft. air hose for diving apparatus (Schedule 2720) for Brooklyn yard.

Wells Architectural Iron Co., 643 Riverton Avenue, New York, has leased space in building at East 133rd Street and Lincoln Avenue for new plant.

Board of Education, Huntington, L. I., will soon take bids on general contract for new school, and plans manual training department. Fund of $550,000 has been arranged for building and equipment. Tooker & Marsh, 101 Park Avenue, New York, are architects.

Continental Can Co., 1 Pershing Square, New York, has let general contract to Austin Co., Philadelphia, for one-story extension, 55 x 390 ft., at branch plant, Baltimore, for storage and distributing service. Cost about $40,000. Company has also let general contract to Austin Co., Cleveland, for one-story storage and distributing unit at branch plant, Norwood, Cincinnati.

Swan Mfg. Co., Passaic, N. J., has been organized, capital $100,000, by L. Swan, Joseph Wilson and associates, care of David B. Kaplan, 657 Main Avenue, representative, to manufacture hydrants, valves and kindred mechanical products.

Northampton Brewery Corpn., Northampton, Pa., recently formed to take over company of similar name, has let general contract to Dyker Construction Co., 122 East Forty-second Street, New York, for addition and improvements in present brewery. Cost over $75,000 including equipment. Company has arranged for financing in amount of $461,000 for work noted, future expansion and operations.

Clinton Mfg. Corpn., Reading, Pa., recently organized to take over Clinton Motors Corpn., with local plant for manufacture of motor trucks, parts, tanks and other equipment, has arranged for sale of stock to total $100,000, part of proceeds to be used for general expansion. Edward A. Hoffman is vice-president and treasurer.

SOUTH ATLANTIC

Greenville Textile Machinery Co., Greenville, S. C., manufacturer of textile machinery, parts, plans rebuilding of part of one-story mill recently damaged by fire.

Board of Trustees, Florida Industrial School for Boys, Marianna, Fla., has secured fund of $50,000 through Federal aid for extensions at institution including new building.

Indian River Refrigeration Terminal, Fort Pierce, Fla., will soon begin superstructure for new multi-story mechanical refrigerating plant. Cost over $125,000 with machinery.

F. J. Cooledge & Sons Paint Co., 1314 Murphy Avenue, Atlanta, Ga., plans rebuilding part of storage and distributing plant recently destroyed by fire. Loss about $30,000 with equipment.

OHIO AND INDIANA

Board of Public Works, City Hall, Columbus, Ohio, plans early call for bids for addition to municipal electric light and power plant, including equipment and improvements in present unit. Financing for $825,000 is being arranged through Federal aid. L. C. Peterman is plant superintendent.

Powell Pressed Steel Co., Hubbard, near Youngstown, Ohio, manufacturer of automobile fenders and equipment, pressed steel toys, etc., plans rebuilding part of plant recently destroyed by fire. Loss about $50,000 with equipment.

Cleveland Steel Products, Inc., Cleveland, has been organized to manufacture steel specialties and will take over Cleveland Steel Products Corpn., 7306 Madison Avenue.

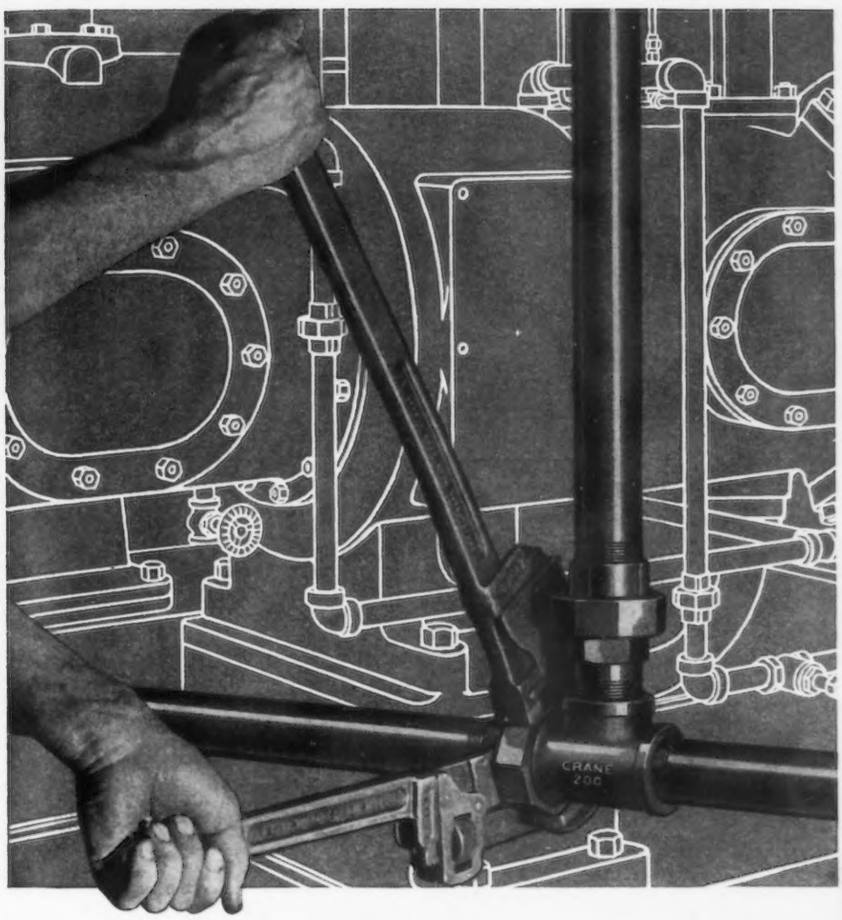
Crosley Radio Corpn., 1329 Arlington Avenue, Cincinnati, is arranging expansion in electric refrigerator division, including additional equipment.

National Distillers Products Corpn., Anthony Wayne Avenue, Carthage, Ohio, with headquarters at 52 William Street, New York, has let general contract to Frank Messer & Sons, Inc., 2513 Burnet Avenue, Cincinnati, for eight-story addition for storage and distribution. Cost over $200,000 with equipment.

Hobart Cabinet Co., Troy, Ohio, manufacturer of metal cabinets, bins, files, etc., plans rebuilding part of local plant No. 2 recently destroyed by fire. Loss over $80,000 with equipment.

Department of Public Service, Troy, Ohio, plans extensions in municipal electric light and power plant, and will soon take bids for equipment, including new turbo-generator and accessories. Cost about $110,000 with machinery.

State Highway Department, State Office Building, Columbus, Ohio, will soon begin superstructure for one-story automobile service, repair and garage building, 100 x 300 ft., at Ravenna, Ohio, for State motor trucks and cars. Cost about $70,000 with equipment.



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NRA Down comes the wrench . . . the entire strain of pulling the pipe line together falls on the union. Often the union must even compensate for slight misalignment.

In service, the union is subjected to the hammer of vibration and the stress of expansion and contraction.

Again, it must stand the abuse of frequent assembly and disassembly.

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THE CLEVELAND-CLIFFS IRON CO., CLEVELAND O.

J. P. Schooley, State Office Building, is State architect.

Board of Public Works, Goshen, Ind., plans early call for bids for extensions and improvements in municipal waterworks, including 500,000-gal. steel water tank on 150-ft. steel tower, two deep-well motor-driven pumping units, three or more gas engine-driven pumps, pipe lines, fittings, etc. Fund of $150,000 has been arranged. Charles Brossman, Chamber of Commerce Building, Indianapolis, is consulting engineer.

WASHINGTON DISTRICT

Virginia Brewing Co., Roanoke, Va., has authorized installation of new brewing machinery, steel tanks, hoppers and conveying equipment. Cost about $25,000.

United States Property and Disbursing Office, Militia Bureau, Sixth Street and Pennsylvania Avenue, N. W., Washington, will receive bids until June 27 for three one-story equipment and storage buildings, gun sheds Nos. 1 and 2, pumping station and other utilities at Camp Simms.

Distillers Corpn.-Seagrams, Ltd., Montreal, Que., has acquired Maryland Distillery, Inc., Relay, near Baltimore, and will expand for new branch distillery. Purchasing company recently organized a subsidiary under name of Joseph E. Seagram & Sons, Inc., to acquire plant at Lawrenceburg, Ind., and is carrying out expansion and improvements at that place, costing about $300,000 with equipment.

General Purchasing Officer, Panama Canal, Washington, asks bids until June 22 for brass bolts, carriage bolts, machine bolts, steel rivets, iron or steel washers, nuts, journal jacks, fire extinguishers, etc. (Schedule 2969); until June 28, 40,000 lb. babbitt metal, brass pipe, centrifugal water pump, 6000 steel bolts, 5000 stud bolts, set screws, nickel steel wedges, yoke bushings and other equipment (Schedule 2970).

Virginia State Penitentiary, room 303, State Office Building, Richmond, Va., will receive bids until June 18 for cotton mill machinery and equipment for installation at local penitentiary.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until June 19 for two resistance welding machines (Schedule 2705), four sets precision gages (Schedule 2706) for Washington Navy Yard; until June 22, rotary snap switches (Schedule 2677) for Sewall's Point, Mare Island and Puget Sound yards.

SOUTH CENTRAL

Buffalo Distilling Co., Frankfort, Ky., has let general contract to Howell & Goin Co., Frankfort, for new multi-story storage and distributing plant at distillery at Stamping Ground, Ky. Cost over $60,000 with equipment.

Common Council, Liberty, Ky., will receive bids until June 26 for equipment for new municipal waterworks, including pumping machinery, filtration equipment, pipe lines, meters, etc. Howard K. Bell, McClelland Building, Lexington, Ky., is consulting engineer.

Waterford Sugar Refinery, Killona, La., operated by Milliken & Farwell, Maritime Building, New Orleans, has asked bids on general contract for rebuilding part of plant recently destroyed by fire, with loss over $60,000 with equipment. H. N. Moody, 823 Perdido Street, New Orleans, is consulting engineer.

Superintendent of Lighthouses, New Orleans, asks bids (no closing date stated) for Diesel engines for lighthouse tender, and accessories.

Gulf Refining Co., New Orleans, has let general contract to Pittman Brothers, 2800 North Galvez Street, for one-story addition to bulk oil storage and distributing plant at Lockport, La., 50 x 65 ft. Cost about $25,000 with equipment.

WESTERN PENNA.

Construction Service, Veterans' Administration, Washington, asks bids until June 22 for boilers, stokers and other power house equipment for institution at Aspinwall, Sharpsburg, Pa.

Consolidated Expanded Metal Co., Wheeling Steel Building, Wheeling, W. Va., a subsidiary of Wheeling Steel Corpn., has plans for one-story plant, 90 x 140 ft., in Beech Bottom district, for manufacture of new line of expanded metal products.

Department of Property and Supplies, Capitol Building, Harrisburg, Pa., has asked bids on general contract for one-story service, repair and garage building, 60 x 200 ft., at Wellsboro, Pa., for State Highway Department, with three one-story shop units, 45 x 55 ft., and two 52 x 55 ft. respectively. Cost over $50,000 with equipment.

City Council, Parsons, W. Va., asks bids until June 26 for extensions in municipal water supply system from Elk Run, including pipe lines, fittings, etc. P. R. Hinkle, Parsons, is consulting engineer.

MICHIGAN DISTRICT

Riverside Forge & Machine Co., Jackson, Mich., plans one-story addition to forge shop, 40 x 60 ft., work to begin in about 60 days.

Detroit Gasket Mfg. Co., 1579 East Milwaukee Street, Detroit, has acquired plant of Peninsular Stove Co., Burt Road, on 18-acre tract, and will use for new plant. Peninsular company has been in financial difficulty, and sale has been authorized by Circuit Court at $275,000.

Accurate Tool & Die Co., Joseph Campeau Avenue, Detroit, is considering erection of new one-story plant unit, 60 x 150 ft. Cost over $30,000 with equipment.

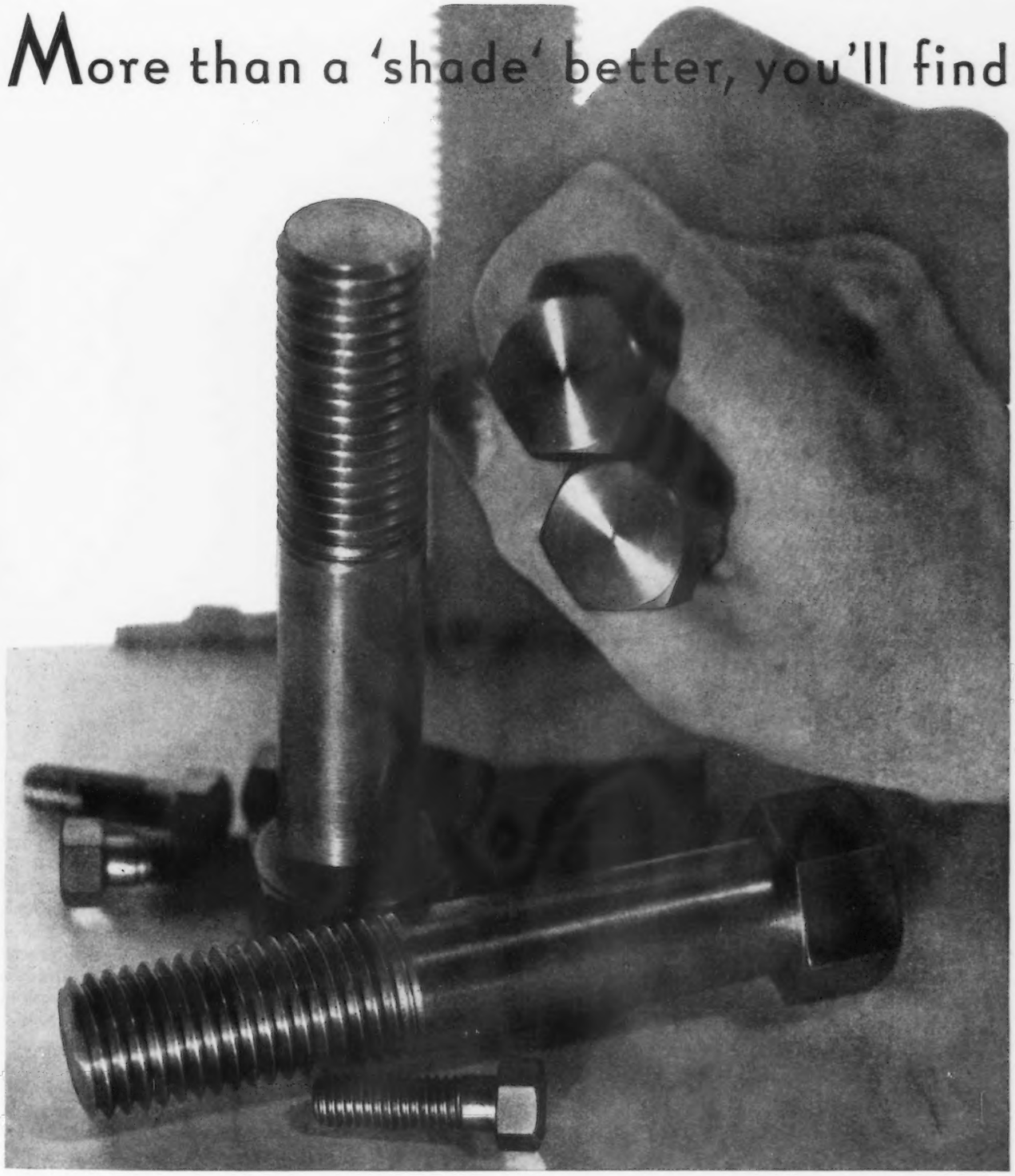
AC Spark Plug Co., Inc., Flint, Mich., has let general contract to Karl Foster, Inc., Flint for one-story addition, 45 x 250 ft., for production of new line of steel bearings. Cost about $65,000 with equipment. Company is a unit of General Motors Corpn.

SOUTHWEST

Union Wire Rope Co., Twenty-first and Manchester Streets, Kansas City, Mo., has awarded general contract to John E. Redmont, Railway Exchange Building, for three one-story additions. Cost close to $30,000 with equipment.

Brown-Strauss Corpn., 1446 Guinotte Avenue, Kansas City, Mo., reconditioned oil refining equipment, pipe, etc., has organized a machinery department to specialize in reconditioned contractors' equipment, including gasoline locomotives, steam engines, air compressors, pumps, drills, etc. Local business of Woods Brothers Construction Co., in this

More than a 'shade' better, you'll find



DUE to the close tolerance to which we can hold our blanks by the Kaufman Method of extrusion, we are able to produce cap screws with correct dimensions and with practically elimination of lead error. We specialize largely on extruded thread cap screws because we can produce a screw of far greater thread accuracy and of much greater strength than by any other method. To the cap screw user these facts insure faster, better assemblies . . . an achievement that means dollars and cents saved in costs of time and labor on assembly lines and in the shop.

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CLEVELAND CAP SCREWS

same line, has been acquired, and will be consolidated with new division. Company has leased building near Guinotte Avenue headquarters for new department, including repair and parts division. George Gagel is manager of new unit.

Universal Gas Generator Co., Houston, Tex., has been organized by E. S. James and M. S. Drake, 2513 Truxillo Street, to manufacture gas generating equipment, parts, etc.

Dallas Brewery, Inc., Dallas, Tex., has awarded general contract to W. H. King, Construction Building, for five-story and basement addition, 50 x 50 ft., to former Lemp brewery, recently acquired, including improvements in present plant unit. Cost about $75,000 with equipment. Charles F. Kruse is head.

Ajax Well Tool Corpn., Houston, Tex., has been organized by Walter L. Church and J. K. Clark, 1524 Maury Street, to manufacture oil well drilling tools and other oil well equipment.

Industry—the Scapegoat of The Depression

(Continued from Page 11)

ment did not vary more than $240,000,000 and fluctuated around $4,000,000,000. In this same period, however, the cost of State government proceeded steadily from $1,242,000,000, up to just under $2,000,000,000, an increase of 60 per cent, and that of local government from $4,790,000,000, to $7,112,000,000, an increase of 48 per cent. The total per capita cost of all government in the United States increased from just under $89 to a little over $107. Between 1922 and 1929 the bonded debt of State and local government increased more than 50 per cent, while the national income rose from 60.6 billions to 85.2 billions or less than 25 per cent.

What did the citizens get for this enormous and disproportionate outlay by State and local governments? We have comparable figures for 1925 and 1929.

A major item is education. This bill increased over 300 millions—that is at the rate of $60,000,000, a year. Undoubtedly much of this went into improved plant, a part of which is shut down today for want of funds to operate.

Another large item is highways. The bill increased 370 millions—over 70 millions a year. This represents a substantial addition to plant for sleeping automobiles to dream about.

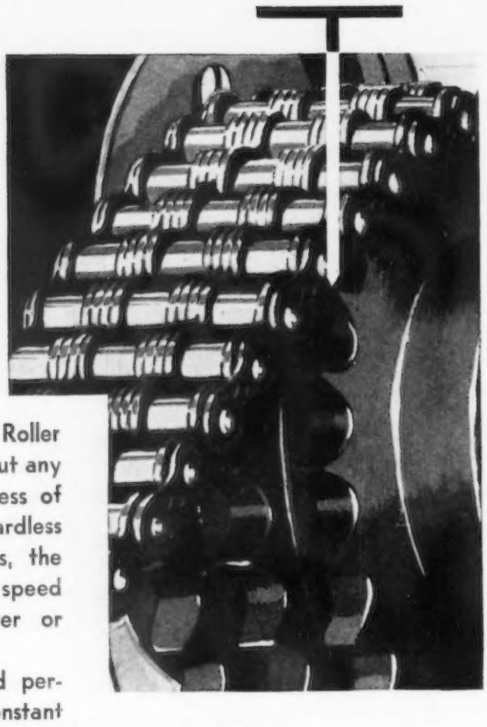
General government, that is the cost of our legislature, and their printing bills, our Governors and their secretaries, our judiciary, administrative boards to license, permit, and condemn and forbid rose about 165 millions. We paid 165 millions more in 1929 than in 1925 for our political talent!

Protection — militia, police, jails, fire departments—the essential for which people have organized into States since time immemorial, was passed over in the gilded era. Between 1925 and 1929 the States actually spent 17 millions less on this item and, estimating the local expenditure for this item during 1929 on the same ratio which prevailed in 1925 (perhaps a doubtful hypothesis) the total bill for protection dropped 65 millions.

But note the items of economic development, social welfare, public utilities, and miscellaneous. These embrace: within economic development—conservation, reclamation projects, agricultural encouragement, Federal harbor improvement, etc.; within social welfare—charity, relief of the poor, aged, and sick, workmen's compensation, conditions of women and children, mothers' pensions, recreation, sanitation and health and the Bureau of Indian Affairs; within public utilities—capital and other expenditures not charged off against

CHAIN DRIVES

—give to Power the CLAWS that NEVER CAN SLIP



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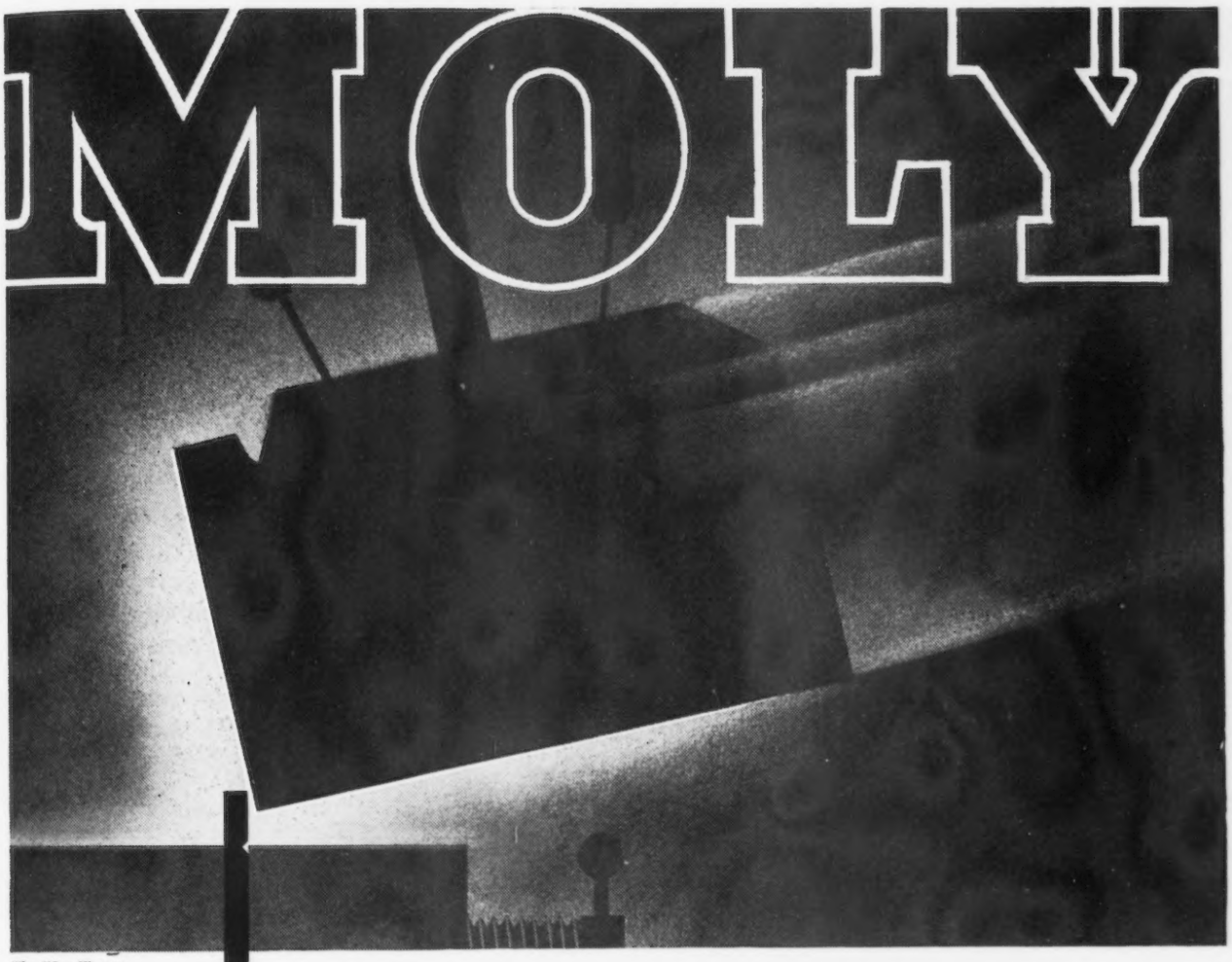

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Embrittlement is the bugaboo of high-temperature steels, and the cause of much trouble when drawing other constructional steels. It can be conquered! A small amount of Molybdenum will retard temper embrittlement, while a .75% addition will completely eliminate this dangerous trouble.

The following comparison of two similar steels, with and without "Moly," shows the effects of this extraordinary alloy when one sample is cooled slowly and another water-quenched after tempering at 1150° for two hours:

Analysis			*Impact (foot pounds)*	
C	*Mn*	*Mo*	*Cooled in water*	*Cooled slowly*
.36	2.24	Nil	74	4
.30	2.30	.52	59	50

In high-temperature installations, a similar condition is often encountered. Why take a chance when the difficulty is so easily and economically overcome?

Molybdenum is one of the greatest discoveries in alloy history. Its many-sided qualities for improving steel and iron have excited the wonder of the engineering and metallurgical world. Resistance to fatigue, shock, creep, abrasion, corrosion and temper embrittlement has definitely been increased under Moly formulae repeatedly tested and proved in service. Machinability of heat-treated steels is economically increased without loss of strength or other essential qualities. *Write for our latest book on Molybdenum.* Discuss your alloy problems with our modern experimental laboratory and engineering service. Climax Molybdenum Company, 295 Madison Ave., New York.

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operating revenues for public service enterprises operated under government authority.

For 1925, Federal, State, and local government, these items cost just under two billion dollars, nearly 23 per cent of the total cost of government, exclusive of debt payment and interest. In 1929 these items had increased for all classes of government to a total of 2705.9 millions, almost 28 per cent of the total.

Industry's Record

HOW did industry perform its function?

Based upon 1923 and the items of expenditure typical to the wage earner's budget, the cost of living rose from 96.4 in March, 1922, to 105.9 in 1925 and then declined to 99.1 in April, 1929.

The variation was greatest in the price of food, and smallest in housing. The cost of light and fuel, with slight fluctuations due to the seasons, declined steadily from November, 1923; clothing, from December, 1925; housing, from July, 1924. Here is evidence that industry while expanding was able to reduce prices and make living easier.

Living Standards Raised

The performance of industry between 1922-1927 is fairly well disclosed by the following table compiled by Frederick C. Mills and published in "Recent Economic Changes," page 607, in 1929 by the National Bureau of Economic Research. The percentages show the average annual rate of change between 1922 and 1927.

Primary production	+ 2.5
Production of manufactured goods	+ 4.0
Ton-miles of freight carried	+ 4.0
Employment in factories	— 0.7
Factory payrolls	+ 1.7
Per capita earnings, factory employees	+ 2.4
Wholesale prices, all commodities	— 0.1
Wholesale prices, products of American farms in raw state	+ 1.2
Prices of commodities at the farm	+ 1.1
Wholesale prices, non-agricultural products	— 1.8
Profits, industrial corporations	+ 9.0
Dividend payments, industrial and miscellaneous corporations	+ 6.8
Prices, industrial stocks	+14.1

Based on revenue freight tonnage, which increased slightly more than 30 per cent between 1922 and 1929, the trend of industrial performances indicated by these figures continued. The rate of wage advances slowed down between 1927 and 1929, but in 1929 wages were 12 per cent higher than in 1922.

Our investment policy and our governmental policies, like the quality of our moving pictures, rest upon the demands of the people and the skill, imagination, and moral qualities of those who offer leadership in those fields. If capital is abundant and yet investors demand 6 and 7 per cent coupons, they must expect a shady security. That in effect was what they asked for and the investment bankers gave it to them. Without any less land in 1925 than they had in 1915, and a population increasing by only about 15 per cent in a decade, yet they demanded 100 per cent or more increase in land values. They got it. Many borrowed in many cases the full value of fictitious increases and then built houses they did not and have not yet paid for.

Similarly in government, nothing was too good for us—provided our children pay the bond issue at its maturity. More schools, more roads, more pensions, more public utilities, more of everything except protection to life and property and the wisdom to comprehend or the courage to face hard facts.

This extravagance was the basis for the demands upon industry which it met by a record of unrivaled production. It did business on a cash or short-term credit basis, and this permitted it to carry through without collapse.

Industry Was on Sound Basis, Finance and Government Were Not

IN a nutshell, industry proceeded upon a value received basis. Government and finance did not.

Your 1929 automobile was a precise measurable reality which worked then and still works. Your 1929 investment was a speculation, related only in words and forms, to tested standards of investment.

When you bought your 1929 radio you bought a real service—not a prospect in a sentimental idea. When you paid your 1929 taxes, however, you bought less rather than more protection, and over a quarter of what you paid went for economic and social experiments whose merits are highly debatable and whose results are wholly immeasurable.

And today you can buy a better car or a better radio, but where is the mortgage broker that will find you a loan for even half, rather than twice the assessed value of your house and lot? You may step into a department store and find sound goods for decent values for any need you have; but when will the police find the Lindbergh kidnapper? How long will it take to catch Dillinger?

And now the government, which by its nature and at its best, can only function wastefully, and which frequently has failed to function at all, spreads its arms over industry. Laying aside, if not abandoning, its own problems of protecting life and property, reducing the public debt, and encouraging enterprise, it assumes to fix prices, distribute quotas, loan the public funds to this man, and crack down on that man.

This is not the spirit of America.